THE

Agricultural Journal

OF THE

CAPE OF GOOD HOPE.

VOLUME XXXI.

JULY—DECEMBER, 1907.

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NOTES.

Government Guano.

The Government Guano Depots at the Railway Stations at Malmesbury, Paarl and Worcester have been closed

Charge for Lungsick Virus.

From the 1st of next month (August) a charge of 3d. per dose will be made for Lungsick Virus supplied by the Government for the purpose of inoculating cattle against lungsickness in conformity with the provisions of Act No. 16 of 1906. All charges must be paid in to the nearest Civil Commissioner or Resident Magistrate before a certificate of inoculation will be granted, except in cases where the owner has obtained the virus direct from the Veterinary Laboratory at Grahamstown.

Packing Apples for Export.

Members of the Fruit Exporters' Association and other exporters under the voluntary inspection system conducted by the Agricultural Department should note that buyers of apples on the English markets prefer boxes holding one bushel, or 40 lbs. net weight. Boxes of a capacity of 18 x 12 ins. x 9¾ ins. deep are reputed to hold this quantity.

Natal and Codlin Moth.

The Natal Government has, in response to representations made by the Agricultural Department of this Colony, consented to allow consignments of apples and pears, which may be found to be infected with Codlin Moth, to be returned to consignors in the Cape Colony, at their expense, by their Natal agents, if they so desire.

London Dairy Show.

The British Dairy Farmers' Association again announce special classes for Colonial butter at their 32nd annual Show to be held in the Agricultural Hall, London, on October 8, 9, 10, and 11 this year. The following classes are open to makers only: Class A—Salt Butter, one box not less than 56 lbs. Entry, 10s. First prize, silver medal and £5; second, bronze medal and £3; third, £2. Class B—Fresh Butter, one box containing not less than 56 lbs. Entry, 10s. First prize, silver medal and £5; second, bronze medal and £3, third, £2. Entries must be delivered at the Agricultural Hall, Islington, London, not later than Friday, October 4 Entries close September 9, or with additional fee of 50 per cent. on September 13. The judging will be by the following scale of points:—Colonial Salt Butter: Flavour, 55 points (should be sweet, mild, nutty); texture, 20 points (should be firm, granular); colour, 10 points (should be clean, straw-colour throughout); salting, 10 points (should be sufficiently salted without destroying the natural flavour peculiar to butter); packing, 5 points; total, 100 points. Colonial Fresh Butter: Flavour, 60 points (should be sweet, mild, nutty); texture, 25 points (should be firm, granular); colour, 10 points (should be clean, straw-colour throughout); packing, 5 points; total, 100 points. The secretary is Mr. Wm. C. Young, 12, Hanover Square, London, W.C., from whom all particulars are obtainable.

£100 Prize for Lucerne Cultivator.

The Cradock Agricultural Society, or rather the Special Committee of that body which has taken up the work, is getting everything well forward in connection with the competition for Lucerne Cultivators, for the prize which has been fixed at £100. The conditions have now been decided upon and have been published. They are as follows:

The prize is £100. The trial is to take place in 1908. The preliminaries state that it must be distinctly understood that the object in offering such an unusually large prize is to attract the inventor and the implement maker, and to convey to them the great importance of, and the large opening (in Cape Colony) there is for, an implement really suited to the frequent cultivation of lucerne sown broadcast. The trial is for a "general purpose" implement to be used on lucerne from one year old and upwards, to produce a fine tilth of not less than three inches in depth (with the object of conserving moisture), to destroy grass and weeds, and which must leave the surface of the ground as even as it found it, and in good condition for irrigation waters. The judges will inspect the lucerne three weeks and also six weeks after the trial to see the effects.

Conditions of Entry.

(1) A fee of five guineas must be paid to the Secretary at the time of entry.

(2) A correct illustration of implement must be sent to the Secretary at the time of entry, or at the option of exhibitor, a "general" drawing to scale.

(3) A declaration of selling price (at Cape ports to be made before a J.P. in this colony, on oath, by the principal in the firm of agents exhibiting), must be sent in to the Secretary at time of entry.

(4) The selling price at Cape ports must not exceed thirty pounds.

(5) Competitors must at time of entry agree to exhibit at Cradock Show (this show will probably be about 6 weeks after the trial, and the award will be made known on the show ground)

(6) Implements must be on the grounds appointed for the trial by the 1st February, 1908.

(7) Entries, etc., etc., must reach the Secretary, Mr. C E Lawford, at Mortimer, District of Cradock, Cape Colony, by noon on the 1st of January, 1908.

Conditions of Trial.

(1) Exhibitor must send implement at his own cost and risk to nearest station to the lucerne grounds selected for the trials.

(2) Exhibitor must at his own cost send a man to work the implement.

(3) The man in charge of implement must obey all orders of the steward in charge of the ground, who will regulate proceedings and see that the wishes of the judges are carried out.

(4) Any neglect on the part of the man in charge of the implement to obey the orders of the steward will disqualify the implement he is exhibiting.

(5) The implement must be able to travel on its own wheels, without injury to itself, over the usual rough Colonial "roads."

(6) Such "teams" and drivers will be provided by the Society as the judges may consider fit and suitable.

(7) A serious fault will be the destruction of lucerne plants, either by pulling them out, cutting or breaking them off, or badly crushing them.

(8) Preference will be given to implements which will complete the work by passing once only over the ground, and those which require to cross work the ground to produce the desired result, will be at a disadvantage, as they will of necessity injure the permanent banks for water leading.

(9) The following will be considered, viz.: The draft, durability, ease of manipulation, general soundness of design, price and weight. Judging will be by points, and 24 will be allowed for depth, 30 for killing grass and weeds, 14 for leaving land level, 14 for tilth, 5 for price, 7 for draft and 6 for construction. Provision must be made for attaching spring balance for testing draft if the judges require it.

(10) The Society will not be responsible for any damage done to implements, either at trial or in travelling to and from the grounds.

Tagasaste, Tree Lucerne.

Mr. J. M. Orpen writes:—I was glad to learn, from your article under the above heading in the May number, that, in consequence of enquiries made now as to the results of the distribution of the seed of Tagasaste about a quarter of a century ago, trees have been discovered to be growing at such different altitudes and under such different climatic conditions in South Africa. They appear to be thriving near the sea level at Tokai and near Cape Town, again, at the Peak plantation, at Atherstone near Grahamstown, at an altitude of 2,000 feet, at Burghersdorp—5,000 feet—at Elsburg near Johannesburg—6,000 feet, as well as in intermediate and wide-apart places and altitudes, such as Darling, the Pirie mountains, the Zuurberg, and Griqualand East. So much for the botanical question of the capacity of growing throughout South Africa. This is so far quite satisfactory. But no experiment whatever appears to have been made here with regard to its being really cultivated and used for fodder, as it is in Teneriffe. The reasons why such thorough experiments have never been made here are evident and most natural. It has been said : We have got good lucerne. Why go further? We want a crop to reap easily with sickle or machinery. Who wants a *tree* for such purposes? That would be fiddling agriculture. Then it has been mistakenly added that the climate of Teneriffe is very moist, so, though it may do well there, it is not likely to do well in our dry climate; also that the seeds refuse to germinate, and that stock refuse to eat the stuff. This is true enough, but it can easily be got over, for this has been *done*—and good reasons can be given why real and fair experiments may be made here. Perhaps you may kindly allow me to tell your readers why this ought to be done in many places and what I know about Tagasaste. I shall first say, that I do not suggest that Tagasaste is to be used to compete as a fodder plant with lucerne on the same soil—though as a testing experiment they may be tried under the same conditions—but to grow without irrigation where lucerne can not be grown well as a crop. This statement may attract the careful attention of your readers to what is to follow.

I have seen how Tagasaste grows naturally, and is cultivated and used in Teneriffe. It was introduced there from the neighbouring small mountainous island "La Palma"—its only original habitat—by the late Dr. Perez, M.D., senior, and is now much grown there by, among others, his son, Don George Victor Perez, M.D. The late Dr. Perez was a good botanist and chemist, and had grit. He found this wild intractable tree growing in La Palma. It is closely allied to lucerne. Chemical analysis shewed it to have the same nutritiousness—in fact, a little more, than lucerne has, but his horses refused to eat it. It gave, in the flowering and

seed time a great crop of white flowers and pods and seed, but the seeds were sulky, they refused to germinate for him. The flowers gave—as they always do—plenty of honey for bees. That is all the wild tree is good for. He determined to conquer nature, and he did it, and what he did others can do. He poured boiling water on the sulking seeds and left them in the water for a day, and planted them in a seed bed—nearly all started growing. He planted them out, a yard apart, in tilled soil, and let them grow as they liked for three years. Then he cut them down to three feet high. In three months' time they had given long soft succulent shoots. These he cut down regularly at intervals, and gave to his horses and stock. The horses struck eating—he starved them into submission. Ever after they were greedy for that food. They throve on it. So did cows and other stock He brought it into notice in Europe, and with the aid of the greatest authority on animal feeding in France he introduced Tagasaste there and in Algeria, and, after thorough testing, that authority gave judgment absolutely in favour of it.

I spent nine months in Teneriffe—from November, 1904, to September, 1905. I saw Tagasaste growing here and there as a tree, say, 25-foot high, in many places, either for ornament or to produce honey. In the last month of my stay I went purposely to see it under cultivation at one of Dr. G. V. Perez' many farms, a large dairy farm near the Cathedral City, Laguna Any passenger to England might run up from Santa Cruz to see it. The electric tram to Tacoconte will drop him at the 13th milestone. Thence a road running north will take him, one mile, to the farm. Where I first saw the pollarded Tagasaste bushes in bearing was to the right of the road, at an elevation of 1,200 feet about, on a place that did not seem to me suitable for ordinary lucerne. It was on a convex, rather steep slope of a hill. All the soil in Teneriffe—where there is any, for it is very stony—is volcanic. This special soil seemed much like dry red brick dust, and not deep *There is no irrigation thereabouts.* Springs are scarce; none were near. There is seldom more than ten inches rainfall per annum, and little dew. The other islands nearer the Sahara are yet drier than Teneriffe. It has only an elevated moist belt high above the sea. The summer in Teneriffe had been a specially dry one—still, the Tagasaste shoots were very luxuriant and juicy. It was a puzzle where that juiciness came from. I can only reason, and shall give my conclusions presently for what they are worth I took my pocket-knife and cut a small bundle of the shoots Walking along through a valley I came on a deep dry "sloot" or "donga," just like those of our Karroo—there are too many of them. In it was a sow with a lot of little pigs. I threw the Tagasaste down to them They all rushed at it and devoured it. In the very large cowsheds and stables I saw plenty of cows, horses, and mules feeding on Tagasaste. In stacks and barns I saw plenty of it just like lucerne, and smelling wholesome. There, at all events, it has proved a conspicuous success. It pays well. The questions are "Why?", and again, "Why should it not be tried and succeed elsewhere?" The burden of condemning such trials would rest with the opponent and be a heavy one.

About geological formation—which may explain where Tagasaste draws water from—the whole of Teneriffe is the topmost ridge of a high volcanic range rising from very deep sea. Generally speaking, its layers of rock have been formed by the cooling and hardening of many successive outflows of lava and streams of mud; so the crevices between those narrow layers often run down at a very steep angle, sometimes even like those in the mountains at Hex River Pass, the Langebergen in Griqualand West, and many other similar places in South Africa. When rain falls, what does

not run right off the surface runs down into those crevices and eventually away down under the sea. For this reason wells in Teneriffe are not dug perpendicularly, but horizontally almost, *i.e.*, as tunnels—sometimes very long ones. The water is thus intercepted. Much of the great irrigation carried on there is with water thus obtained. Such tunnelling might answer in some places in South Africa. Tagasaste is much like lucerne. Both will push roots down to great depths to suck up moisture. In this they are like our invaluable Karoo bushes—and that explains probably where the juiciness of those shoots, which I saw, came from after that long drought in Teneriffe. For lucerne, we in South Africa, I think, at present seek mainly deep, rich, alluvial soil. We have not too much of that—it is mostly in small areas. Outside these, we often see wastes more or less barren, sometimes stony and rocky, and carrying bushes which—however luxuriantly they may grow—are of no value for stock. Speaking under correction, it seems probable that the extension of the stock feeding capacity of much of South Africa will have to be sought in getting good, permanent fodder plants and pasture plants to grow without irrigation outside what may be called cultivateable areas—the deep soil we would now generally select for the cultivation of lucerne or forage. It seems possible that lucerne itself can be got to grow without irrigation in many rocky places, but then it will be as a herbage plant—not a forage plant—one could not cut it with a mowing machine. I have seen lucerne shooting up all along crevices in rocks in veld in a drought and browsed short.

In such localities, and many others where we could not manage lucerne by mowing, Tagasaste might probably be grown to better advantage, and be of more use in the form of a pollard bush. We have the fact before us that lucerne and Tagasaste are grown in the same areas, and each has been found to have its good points. The question here is: What are these good points under South African conditions, and can either or both be used for fodder or pasture in parts not hitherto considered proper for lucerne. If not, or besides these, other plants or trees should be systematically experimented with *in order that South Africa may be enabled to produce more stock and food,* just as we must experiment with *trees* to make more South African homes. You mention loppings of hedges of Tagasaste being used for forage. I never observed any hedges of it in Teneriffe. I once saw two men with some big bundles of cuttings of uniform length and of two years' growth, before them—they were evidently from neglected pollards. They were peeling from the cuttings the bark with the little shoots and leaves, and their taking that trouble was, I thought, an evidence of what they thought of the value of the green stuff. I asked Dr. Perez what preliminary experiments he would advise. He said: "Plant in various localities bits of land only 25 yards square with Tagasaste plants one yard apart, and as a demonstration." He added advice as to following further his father's procedure, which I have described above. No other procedure will succeed. This experiment appears never to have been tried in South Africa. The facts you mention prove that Tagasaste will grow almost anywhere. Those I have mentioned shew how drought resistant it is, and how desirable practical experiments, such as I suggest, must be. They are quite easy and cheap, and till they are tried no progress can be made. Object lessons are required, since many, like Thomas, must actually see before they will believe and act. The Department has plenty of seed, and can get plenty more for nothing. It can conduct these simple experiments itself, and can give away seed and direct the experiments which others will be willing to make.

FARM AND VELD.

" Thrips " in Onions.

A correspondent complains of being troubled with the insect known as "Thrips" in his onions, and asks for a remedy Spraying with Bordeaux mixture has proved effective in several districts in this Colony.

Thymol for Worms in Chickens.

Mr. B. Bolton, of Observatory, writes: "In the early part of January last your Department kindly examined a dead chicken of mine, and reported that it had been suffering from white intestinal worms. I had lost twenty-nine in a month, but the remedy you supplied stopped the disease at once, as I only lost three after, and they were nearly dead when I gave them the medicine. Thymol was the remedy supplied, and now that such a length of time has elapsed without any recurrence of the sickness I consider it an unfailing remedy for intestinal worms." The treatment in question is Thymol 1 grain in the form of a dough pill, morning and night

An Interesting Potato.

A sample of a remarkable potato has been forwarded by Mr C. N. Lake, of Ugie, Griqualand East. His experience is so different to the usual record of deterioration that it deserves to be chronicled Mr Lake has been growing this potato, which we have not been able to give a name to, for twenty-five years. He writes: "These potatoes were for weeks under water this year, and you may judge for yourself. All my neighbours have lost their crops this season through wet—chiefly imported seed. I have never sold seed, and always found a ready market for eating potatoes.' The specimens alluded to are excellent tubers; firm, unshrivelled, thin-skinned, and of bright colour. They are a long oval, with a smooth surface, and a remarkably flat, shallow eye They are potatoes in which there is a minimum of waste, they are free from scab and have all the indications of a good keeper.—E.A N.

Sweet Potatoes v. Mealies for Ostriches.

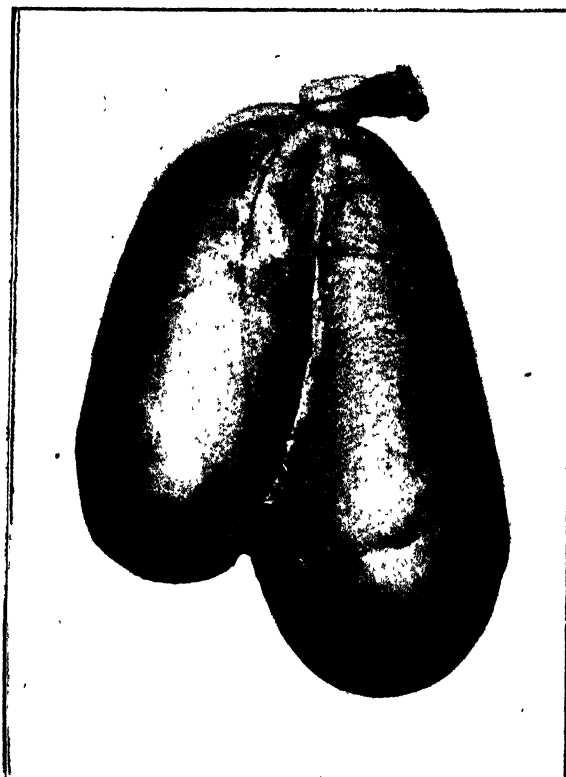
"Novice" writes asking to be informed of the relative feeding propertiens of sweet potatoes and mealies for ostriches. The composition of sweet potatoes and mealies is as under:—

	Mealies.	Sweet Potatoes.
Water	12·7	66·39
Ash	1·6	1·21
Crude Albumenoids	10·1	2·24
Crude fibre	2·3	1·08
Carbohydrates	68·6	28·58
Crude fats	4·7	·50
	100·0	100·0

The albumenoid ratio of mealies is 1·8, that of sweet potatoes about 1·13; hence to equalise the diet in this respect a food rich in nitrogen, as bran or lucerne hay, should be added to the sweet potatoes. Again, one-eighth of mealies is moisture, while two-thirds of sweet potatoes is water. In considering the nourishing values, this fact must be remembered. Sweet potatoes chopped up like prickly pear or mangels might serve as a useful food, but would be found to be fattening rather than strengthening, and should be fed cautiously at first, and never in excess.—E.A.N.

A Freak of Nature.

Mr. G. A. Temlett, of Fort Cox, Middle Drift, forwarded a rather remarkable specimen last month, an illustration of which is given herewith. He states that on opening a sheep he slaughtered he found it had two galls joined together, having similar appearance to the testicles of a goat ram, with a short open space at the bottom, as is usual in the case of that animal. On emptying them, he found two separate outlets. On blowing them up he had to insert a straw in each outlet separately as there was no communication between the two. He says that having opened hundreds of animals and never having seen anything of the sort before, he would like to know if it is not unusual. Mr. J. D. Borthwick, Chief Veterinary Surgeon, says he has never seen such a case before, and looks upon it as something quite unusual.



Double Gall Bladder in Sheep.

A Jersey-Shorthorn Cross.

Mr. R. Silva-Jones, the Government Dairy Expert, gives the following details, in a recent report, of the milking herd of Mr. Pigott, of Langley Park, who has so successfully crossed the Jersey and Shorthorn breeds, and has found a very considerable increase in his butter return. The milk of twenty of his cows, all that he was milking at the time, was tested, and

the results as given below speak for themselves in so far as the butter fat is concerned:—

1. Artikol	6·0	Butter fat,	half-bred Jersey-Shorthorn
2. Drikol	5·9	do	do.
3. Zwartmaas	5·1	do.	do.
4. Sunday	4·9	do	do.
5. Kleinmate II.	4·7	do.	do
6. Monday	4·6	do	do.
7. October	4·6	do	do.
8. Wednesday	4·1	do.	do.
9. Alexandria	4·9	do.	Thoroughbred Jersey
10. Pontac	6·1	do	Shorthorn.
11. Geelmaas	4·0	do.	do.
12. Sterry	3·6	do	do.
13. Pompey	3·3	do.	do.
14. Kleinmate I.	3·3	do.	do
15. Duiker	3·3	do.	do.
16. Kookie	2·9	do	do.
17. Vetlise	2·8	do	do.
18. Falk	3·0	do	do.
19. Pompoon	3·0	do.	do.
20 Douglassi	3·4	do.	half-bred Jersey-Shorthorn.

A second sample was taken, and gave identically the same result. The half-breds are a first cross from Shorthorn cows by a pure-bred Jersey bull, the cows being almost pure Shorthorn, as Mr. Pigott has had no other breed among them for more than fifteen years The cow "Artikol" when in full milk gave 2½ gallons per diem, and "Pontac 3 gallons, grazing on tho veld without artificial feeding. The latter is almost phenomenal for a Shorthorn.

Dried Figs from Wellington.

Mr P. J. Cillie, C.-son, of Vruchtbaar, Wellington, sent in some dried figs last month grown and prepared by himself. In his covering letter he says:—" The variety is the 'White Adriatic,' imported by me from California eight years ago. The fig trees are a healthy, strong growing kind, and a most regular bearer, giving only one crop every season. The process of curing is very simple. We picked the figs when fully ripe, spread them—unpeeled, of course—on our ordinary fruit drying trays, just as other kinds of fruits are spread for drying, gave them a light dose of sulphur, and put them in the sun. After the third day they should be turned daily. It took from six to eight days to cure them properly. When dry the figs were dipped in a boiling solution of brine, one lb. of common salt to 10 gallons of water, spread in the sun for a few hours, and were then ready for packing. A sample was taken to Cape Town, and the prices paid makes it certainly one of the best paying fruits on my farm. The buyer in Cape Town told me a few weeks later that he will take 20 tons if I could supply, as there is a ready sale for a Colonial dried article which is decidedly superior to the imported Smyrna fig."

The sample sent in by Mr. Cillie was excellent in every sense, and we submitted them to several people who all agreed in this verdict. The only criticism that could be offered is that the get-up was not equal to the imported article. Packed in layers in boxes, with a neatly folded lining of white paper, they should prove most attractive to consumers. If anything is to be made of this trade they should also be marketed with a special

brand so that buyers would know they were receiving an article which could be relied upon. When one considers the very large quantities of dried fruits still imported, there should be plenty of room for a special line of this description, while the distribution of this money among our farmers would be very helpful in such times as the present. What is most encouraging, however, is a further statement by Mr. Cillie that he is convinced from his experience that we can produce all the dried figs consumed in this country That means the opening up of still larger markets later on, should the industry become a success. The variety of fig, so successfully handled in this case, the White Adriatic, is obtainable of Messrs. Pickstone, the well-known nurserymen, of Groot Drakenstein. It must be borne in mind that it is not every variety which can be dried successfully.

Aptha or Vesicular Stomatitis of the Horse.

As this disease has been prevalent of late we reproduce the following from the article on the subject by the late Dr. Hutcheon, M.R.C.V.S., published in the *Agricultural Journal* in May, 1898 (vol. xii., No. 11.): —

This is an eruptive febrile affection of the horse, characterised by an eruption of vesicles which appear on the tongue, inside of the lips and cheeks, and frequently occur on the outside around the muzzle and nostrils. These vesicles—aphthæ—are irregular both in size and shape, but they are usually circular of a yellowish colour, and slightly raised above the surface of the mucous membrane. These vesicles burst, and form ulcerous-looking sores, which often run together, leaving the tongue and lining of the lips and cheeks quite raw and very painful; rendering the animal unable to feed except with great difficulty. This last condition is most frequently observed in aged or debilitated horses. In a healthy, well-nourished animal the disease is generally mild, and invariably yields to simple treatment

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The disease is communicable by inoculation, but it does not appear to spread rapidly by infection For instance, a healthy horse with a clean and uninjured mouth may eat out of the same manger with a horse which is suffering from the disease, and remain free from any appearance of it. But if there are any sores or abrasions about the horse's mouth, produced either by the bit, or from feeding on thorny bushes, such a horse is very liable to become affected. When a human being becomes inoculated through having cuts or abrasions of the skin of the hands very intractable sores are sometimes produced.

This disease appeared in the Colony about the beginning of March, 1884 ,and was first reported to me from King William's Town and Peddie districts; I was unable to find out where it originated. Previous to that it must have been very rarely met with, as many old and experienced farmers and horse owners informed me that they had not seen it before. Many were of opinion that the disease was introduced by the horse eating prickly pears and thorny bushes; the ordinary food being very scarce at that time on account of a prolonged drought. But I saw it amongst horses in localities where there were no prickly pears on the veld and also among stable-fed horses. It certainly prevailed most, and was most severe and intractable, amongst poor and debilitated horses, whether the poverty was induced by insufficient food or hard work.

Disorders of the digestive organs are recognised as a cause of this complaint, both by human and veterinary pathologists. It is quite possible, therefore, that the disease arose, in the first instance, from some peculiar local conditions, associated with the food or water, acting on an enfeebled constitution, but there can be little doubt that it assumed a contagious character of the nature above described.

The disease prevailed most along certain post-cart routes, and amongst the horses belonging to the Cape Police. When it entered a stable of post-cart horses, it generally affected the majority of them. On the other hand I knew of numerous instances, in private stables, where one horse only was affected, although no efforts were made to isolate the sick one, or prevent him from eating and drinking out of the same vessels with the others; it disappeared very much as it came, without any very apparent reason Since that time, however, frequent individual outbreaks of this disease have been reported; one of these occurred in the Swellendam district during the year 1895

Treatment.—This resolves itself into constitutional and local remedies. *First* with respect to constitutional treatment, if the affected animal is otherwise in good condition, give him a pint of raw linseed oil followed by a teaspoonful each of saltpetre and flowers of sulphur, daily, while the complaint lasts If, on the other hand, the horse is poor and debilitated, add a teaspoonful of sulphate of iron to the above mixture, and supply him with soft, succulent, nourishing food, such as bran mashes, green food, carrots, etc

Second: Local Treatment.—This consists in cleaning out the mouth three times a day, with antiseptic astringent lotions such as strong solutions of alum, bluestone or boracic acid, an ounce of either dissolved in a bottle of water When the mouth is very sore, raw, and smells very badly, add half an ounce of carbolic acid, or an ounce of Jeyes' fluid, to any of these mixtures. There are many other lotions which may be used, such as solutions of chlorate of potash, salicylic acid, and many owners use little else but common salt and sulphur, placed in the mouth.

The simplest and easiest method of dressing a horse's mouth, is to elevate the animal's head, then quietly introduce the neck of the bottle containing the lotion into the side of the mouth, and allow the mixture to run out of the bottle until the horse's mouth is pretty full, then gradually lower his head, when he will rinse out his mouth by the action of the tongue as the fluid trickles out. Do not attempt to throw or dash anything into a horse's mouth, or it will cause him to resist any subsequent dressing.

Spraying and Spraying Appliances.

Messrs. Geo. Findlay and Co., of Cape Town, forward copies of three interesting little publications which they are distributing. They deal with the important question of spraying. One entitled "Spraying for Profit," is teeming with information useful to all agriculturists. It is by H. E. Weed, a well-known writer on the subject, and is a really practical handbook dealing with the best methods in use for suppressing the most

common injurious insects and fungous diseases which attack crops of all descriptions. It shows in the simplest form the general principles which should guide spraying for the different pests, the materials to use, including special preparations, gives particulars of spray pumps and outfits, a summary of plants and farm animals benefitted by spraying. The other two are pamphlets giving illustrated details of the Deming spray pumps, nozzles, etc. Messrs. Findlay and Co. offer to forward these free of charge to any of our readers applying for same on mentioning this Journal. They are most useful and informative, and would prove of value to any farmer.

Dips and Dippers.

Cattle dipping for ticks has very evidently come to stay with the farmers in the tick-infested areas of the Eastern Province. It is not very long since farmers looked askance at it, and could with difficulty be brought to admit that there was even the remote possibility of good in such a system. Now we find them publicly honouring the men who have taken any prominent part in forwarding the movement. Mr. Sidney McDougall, of the old-established firm of dip manufacturers, left East London last month for a trip to the Old Country, and on the eve of his departure was entertained at a farewell dinner by the West Bank farmers. Messrs McDougall have constructed a splendid dipping tank on the West Bank, and have convinced the farmers by ocular demonstration of the efficacy of dipping. Mr. C.E. Nicholls, the chairman at that function, waxed enthusiastically eloquent in his compliments He showed how dipping had widened the farmers' horizon. How, from considering themselves passing rich with one span of oxen and a few cows, whose progeny paid such a heavy toll to disease caused by ticks, they could now picture "the cattle upon a thousand hills," and a steady increase of wealth in sleek, healthy oxen. Mr. Sidney McDougall has done good work, and deserves the thanks he has received

MILK RECORD.

ELSENBURG COLLEGE HERD.

Appended will be found details of the quantity of milk produced by cows now in milk or gone dry during June. The individual differences are surely sufficient to warrant even the smallest cow owner keeping a record for the purposes of weeding out the unprofitable. All figures are down to June 30th.

Breed and Cow.	Days in Milk.	Total lbs. given.	Daily Average lbs.	Remarks.
FRIESLANDS.				
Cleopatra ...	251	7684·	30·6	
Romula	139	1496·5	32·3	imported.
Victoria ..	128	3517·5	27·5	3rd Calf. Recently
*Rose	274	5668·	20·7	1st ..
†Violet .. .	11	266·	24·1	2nd ..
JERSEYS.				
*Hylda	418	8670·	20·7	
*Rosa	269	4283·	19·6	1st ,,
*Gilliflower ...	442	6923·	13·6	1st ..
†Gladys ...	24	853·5	35·5	
†Gertie ...	14	504·5	36·	3rd ,,
AYRSHIRES.				
Cherry	70	1771·5	25·3	3rd ..
†Queen Dot	19	656·5	34·5	2nd ..
SHORTHORN.				
Maggie	280	5551·	19·8	1st ..
CROSSES.				
Bessie	243	7418·5	30·5	
Jessie ..	212	3699·	17·4	
Disa ...	88	2079·5	23·6	

*Now dry. Rose gave 3,318 bottles, and was in milk 274 days.
Hylda ,, 5,076 ,, ,, ,, 418 ,,
Rosa .. 2,508 ,, ,, . 269 .
Gilliflower ,, 4,050 .. ,, ,, 442 ..

†Calved during June.

Return of Fruit Shipped from Cape Colony to England during May, 1907.

Port of Shipment.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town	105	Apples	3,150	15 18 0
,,	1,237	Pears	37,110	186 10 0
,,	354	Grapes	4,380 lbs.	52 10 0
Port Elizabeth ...	217	Pines	9,893	36 0 0
	1,913			£290 18 0

CHEDDAR CHEESE MAKING.

By R. Silva Jones, Government Dairy Expert.

Introductory.

The increasing demand for information and the continual requests from farmers and others for information on Cheddar Cheese-making has caused me to write this article, and in it to explain fully, from a practical point of view, the whole of the process from beginning to end. And to make it as explicit as possible, in the hopes that it may be of use to the cheese-maker and at the same time of use to the farmer who intends to start this lucrative industry, in so far as that by its simple and explicit explanation it should be within the bounds of possibility for an energetic young farmer to be able to commence cheese-making simply on this article. But still, notwithstanding this, I would always advise anyone previous to beginning cheese-making to spend a couple of weeks if possible at some farm or factory where good cheese is being made, he would then be better in a position to thoroughly understand the process without any fear of not doing what ought to be done

First let it be understood that the process is, practically speaking, a long and tedious one, especially if one is making up small quantities daily; but if one has a fairly large quantity, the maker will always find his time fully occupied, that he has little time to spare, and consequently does away with the tedious waits that occur during the process. For this reason it is not all men who make cheesemakers. One of the principal virtues of a cheesemaker is patience, as the whole process is one of fermentation, and one often has to wait patiently for the fermentation to increase. An impatient man would often not wait for the ferments to work, and would perhaps finish off when the cheese would be found to have suffered very much in quality when the time comes to realise on the market. The process, when once known, simply requires care and watchfulness to bring about good results, the results of one day compared with the results of another with the continual idea of improvement in quality.

The type of cheese suited for this country is undoubtedly what is termed a hard cheese, that is, one that has undergone considerable pressure during its manufacture. This makes it a cheese far more easily transported than any other kind, which is a very great consideration in this country At the same time this type of cheese is one that takes at least three months to ripen, and is better if left a little longer. It can be kept for at least a year without deterioration, although it will, if kept so long, certainly loose a little in weight, but this is nothing in comparison to the maker's independence of the market, for he is not bound to sell at once. If a suitable market cannot be found this month it can easily be held over till the next and so on.

Of this type of hard cheese I think the cheddar is the most suitable to our conditions and requirements, because of its greater ease of transport. Its demand on the Colonial market, too, is greater than others, and it is the class of cheese that has been more generally studied than any other, and has consequently been more standardised in its manufacture which is a tremendous help especially to the beginner.

Every portion of the article where it permits has been illustrated to more fully help the reader to readily understand what is meant, and for the illustrations of utensils and quotations of the various sized plants I have to thank the firm of Messrs. D. E. Hockly and Co., East London, a firm which lays itself out in every way to meet the demands of the dairy farmer, not only in cheese plants but in all description of dairy requisites.

Buildings.

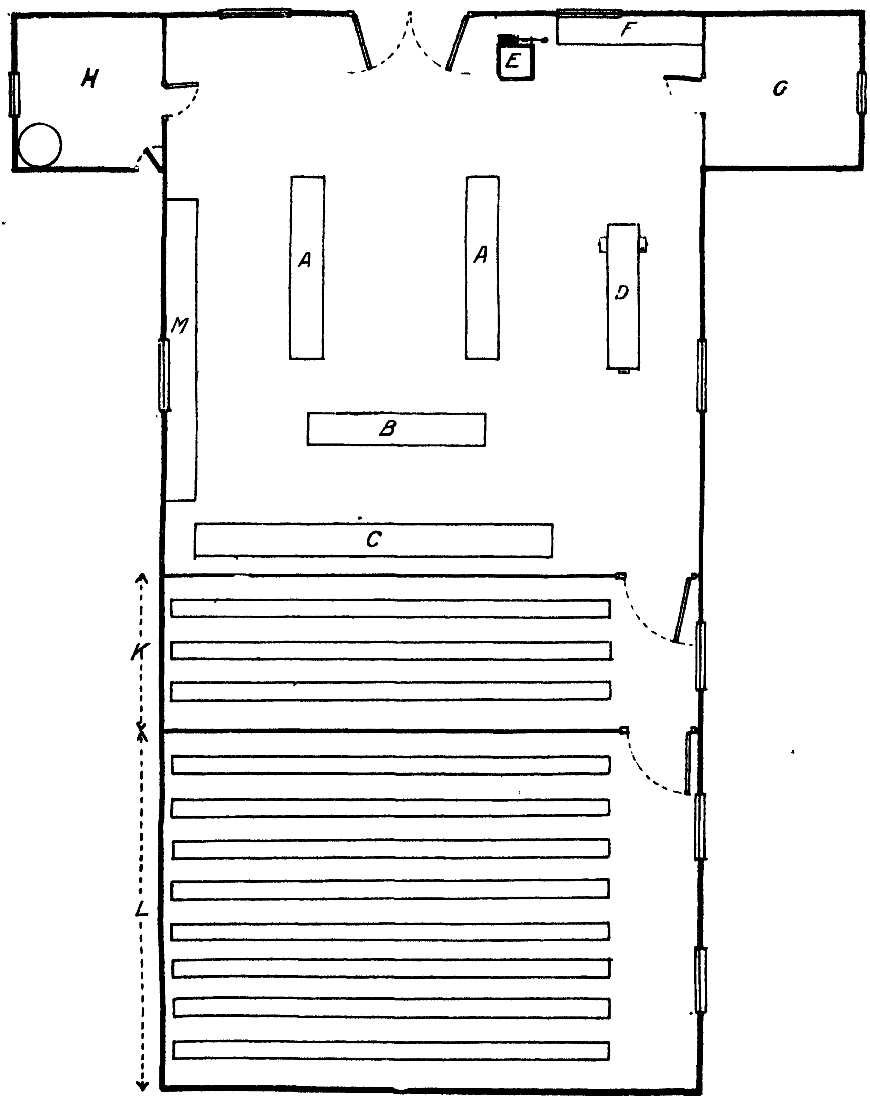
The buildings required and necessary for cheese-making are not very extensive, but there are some essential points to be watched in their construction. Existing buildings can often be altered and changed to make excellent making and ripening rooms.

The rooms required are three in number, and are most convenient for working if they are all three attached and under one roof. They are the working room, ripening room and the boiler and wash-up room. The ripening room is best divided into two, that is one for the young cheese and the second for the older One room is often made to suffice for the two and answers well, but to anyone either building or converting existing ones I would recommend the two, the reason for which will be explained later on. The position of the rooms should be such that it economises space and saves labour A very good plan of a cheese building is shown below, and will be found to answer the purpose well, the size, of course, must be judged by the amount of milk treated daily when the number and size of vats and coolers, and the number of presses will have to be taken into consideration and allowed for, but the illustration will serve to show the idea of such a building.

With regard to the material used for the building, brick or stone is without doubt the best. The walls of the making room and the two small rooms can be of ordinary thickness, but the two ripening rooms require to be more heavily built in order to carry a more even temperature, and the better plan is, I think, to make a double wall with air space in between or the space between to be filled with non-conductive material, such as cinders; but I think the air space is far preferable. The walls should be high, the higher the better, with a gable roof, to leave plenty of air space above the cheese that is on the shelves ripening. With regard to the ventilation, this must be carefully attended to without causing a draught, and the ventilating holes through the walls must be placed high up above the level of the top of the shelves with a ventilator in the roof. The floor should be of cement throughout, and in the making room special attention is required to see that a proper fall is obtained to drain water, etc., off quickly. A drain should also be made below the whey outlet pipes of the cheese vats. It is necessary that the whey, when the curd has reached its proper condition, should be run off quickly. The laborious task of running off into buckets is bad and cumbersome, makes work, and is likely to cause trouble, with being spilt about in the carrying. Have the drain made so that it can run the whey off into a tank for pig feeding, which should not be closer to the dairy than, say, 50 yards, as there is always a certain amount of smell which will, if closer, be not only unpleasant but dangerous to proper and successful working. The windows should be in the ripening rooms double to secure a more even temperature, and should be so placed that the light is well thrown down the terrace of shelves, and be placed, as far as possible, so that when open they do not create a draught on the cheese. The outside should be covered with fly proof gauze. These windows should always be curtained to keep out strong light. The shelving on which the cheese

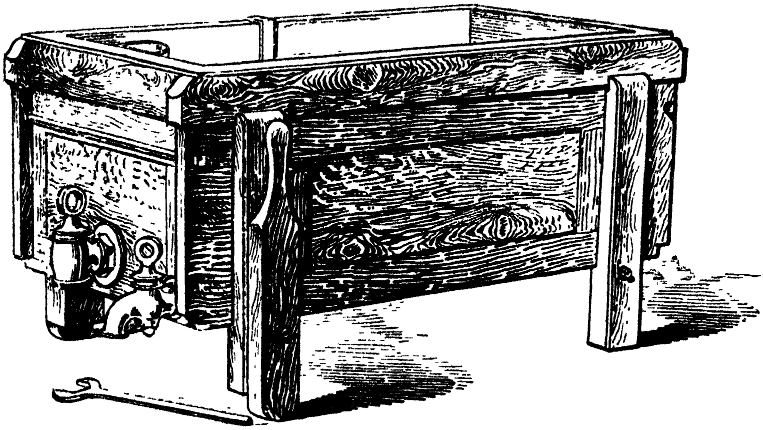
stands to ripen should never be placed against the wall, but always leave space for circulation of air all round the ways, the shelves should, as shown in the diagram, run parallel up and down the room, and be of sufficient

ROUGH GROUND PLAN OF CHEESE-MAKING DAIRY.

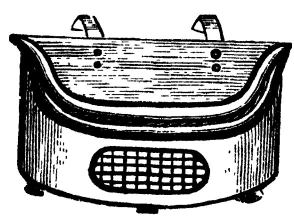


(*A A*) Cheese Vats; (*B*) Cooler; (*C*) Presses; (*D*) Movable Table on wheels to go right into both ripening rooms; (*E*) Scale; (*F*) Office Table; (*G*) Store Room; (*H*) Boiler and Wash-up Room: (*K*) First Ripening Room: (*L*) Second Ripening Room; (*M*) Table for Utensils.

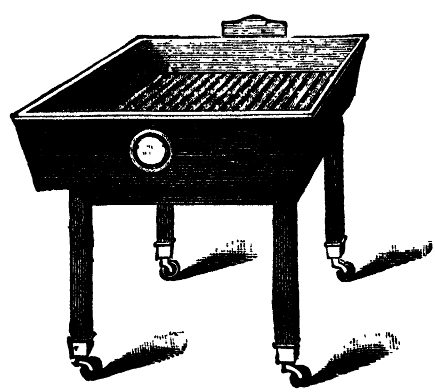
width apart for the cheesemaker to pass comfortably in between the rows in order to turn the cheese, and they should not be too far apart, for they serve the purpose very well for improvised steps for the one turning to stand on in order to reach the top shelves. The distance apart of the



THE CHEESE VAT



THE METAL STRAINER.



THE COOLER FOR CURD

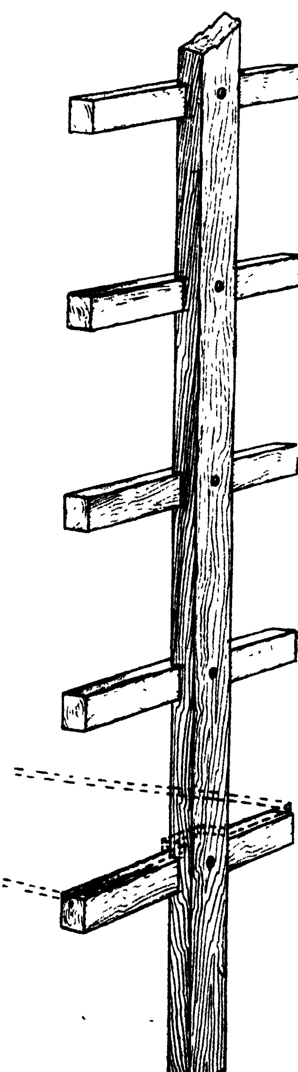


DIAGRAM OF UPRIGHTS FOR SHELVING ARRANGEMENTS.

The upright is fastened to the floor at the bottom and at the top with cross pieces. The cross-bars are let into the uprights and bolted. The shelves are laid upon the cross-bars, but not fastened to them for ease in removal for cleaning.

shelves will be decided upon by the size and shape of cheese made. This will also control the width of shelf, but be careful to see that each shelf is one piece of wood in width, or unless properly joined together it will mark the cheese. Whatever height of cheese is made at least three inches should be left from the top of cheese to the bottom of next shelf. A good plan is to make the bottom shelves a little wider than the top ones, to meet any contingencies in size, when the larger cheese will then be on the lower shelves. The best and most successful structure for the shelving is shown herewith.

In dairies where a large amount of milk is to be made up daily I would certainly recommend a small steam generator. In this case the vats can be connected up with steam for the scalding process. Steam is in every way preferable, it saves labour, and everything can be so well sterilised after use. In very small dairies this may be found too expensive and cumbersome.

A very handy adjunct to the working room is a table on wheels which is so made as to go straight through into the two ripening rooms, it also saves a deal of carrying and lifting.

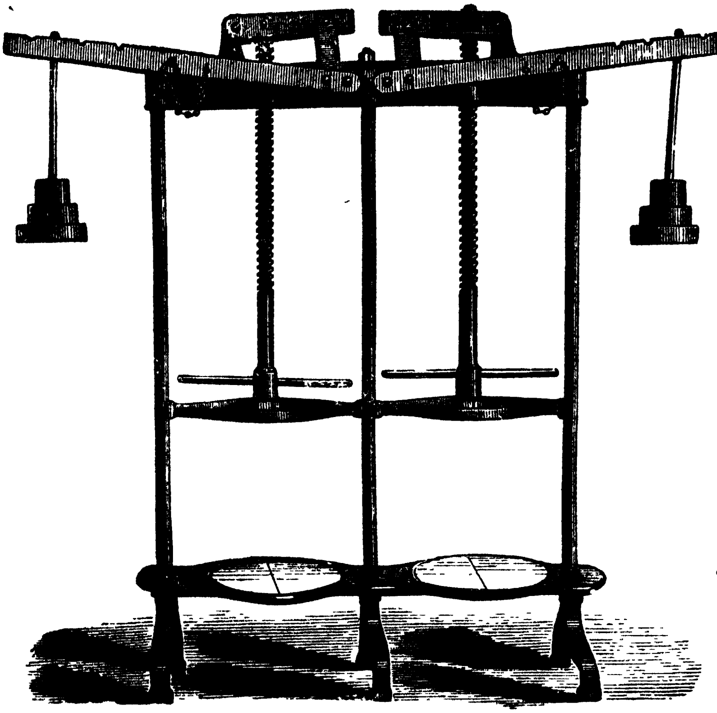
Implements and Utensils.

Firstly and foremost is the cheese vat.

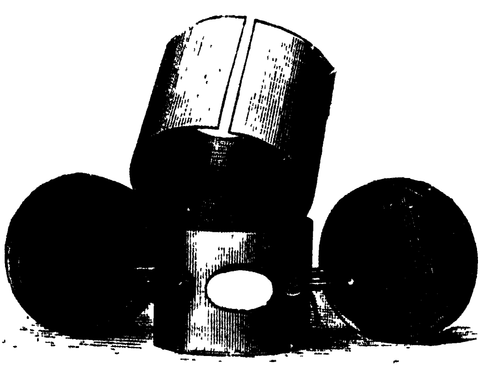
These vats are double jacketed, the portion of the vat for the reception of the milk being quite apart and separate from the outer shell, and can be removed and should be removed from time to time, as sediment often collects at the bottom. They are fitted to be used both with hot water and steam, steam from a small generator being much preferable, as it saves a great deal of labour in water carrying, and I think one has greater control over the temperature. The steam tap to be fitted close above the vat. Always see that the whey outlet tap is slightly below the level of the bottom of the vat to facilitate the letting off of whey; it must also be large, so that the whey can run off quickly and without any stoppage. The vat is also fitted with a tap for the outlet of hot water from the outer jacket, and also an outlet pipe when steam is used. An arrangement is fitted by which the vat can be tilted to facilitate the draining of the whey, and also a measuring scale, which has to be used when the vat is standing perfectly level and hung over the centre. This measuring scale requires to be tested occasionally, as sometimes the vat after continual use, sags a little in the centre, and consequently the vat will hold a little more than the measuring scale actually shows. A wooden lid is also required which can be made easily and nicely out of ordinary ceiling board, but it should be made in two halves to facilitate work. The lid should be made to fit the vat neck, as it is particularly required to keep up the temperature, and therefore requires to be close fitting. A metal strainer is also used in connection with the vats, and is made to hang into the side. A strainer, which is with the measuring scale, included in the price of the vat, fitted for straining of the whey from the vat, and is so made to be fitted on to the inside of outlet to be removed and replaced at will.

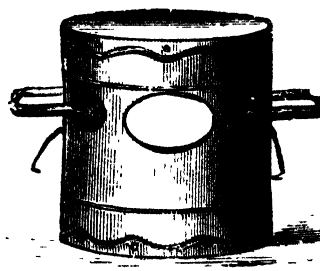
Another indispensable utensil is the cooler, which is made in various sizes to suit the size of the vat used, and is fitted with a loose wooden ribbed rack to facilitate the drainage of whey, and arrangement is made for putting in hot water to keep up the temperature of curd. An outlet plug is also fitted, as are also wheels to the legs, so that the cooler when not in use can be pushed away easily.

Over the wooden ribbed bottom a cheese cloth is always spread prior to the curd being placed thereon.

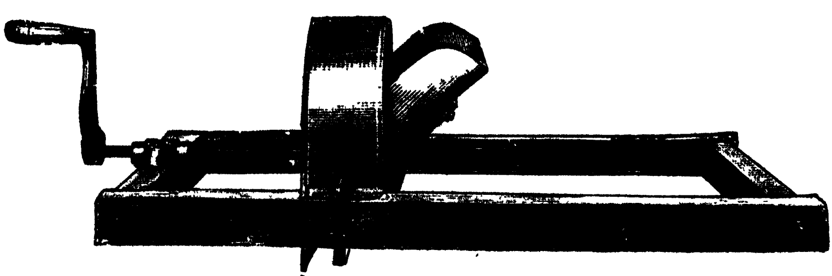


LEVER CHEESE PRESS.





CHEESE MOULDS.



CURD MILL.

Many descriptions of cheese presses are in the market but most of them work upon the double lever system with screw, and are continuous. For small dairies I prefer the one as illustrated, being strong and durable and with ordinary care will last a lifetime.

For larger dairies the gang presses are preferable, taking a larger number of cheese, and they work horizontally in place of vertically as with the lever presses. They are, of course, more costly to purchase.

The moulds are a very important item, and I can recommend none better than the Australian models. (See Illustrations.)

These would collapse with the cheese as it is pressed, and care should be taken that too much curd is not put into them. Practice will prove about what weight, according to the condition, of curd, to put into them. With these moulds a seamless cloth bandage is supplied, and should be used with them. This cloth in the smaller size is woven in lutes of three and it will be found much better for ease in use, if these lutes are cut separate and rolled upon a stick or on a towel roller. The cloth is then kept clean, and if the roller is nailed to the wall above the table where the moulds are got ready the benefit will be apparent.

The curd mill is one that attention should be given to, the older style of mill used which crushed the curd too much has been superseded by a newer type, which cuts the curd and does not bruise.

Two knives specially made are required, the one cutting vertically and the other horizontally.

Treatment of the Milk.

The treatment the milk received immediately it leaves the cow is of very considerable importance. The whole process of cheese-making is one of fermentation, and with a little careless handling it is so easy without even at the time knowing it to destroy any chance the cheesemaker has of turning out a good article. With anyone cheesemaking themselves or purchasing milk from neighbouring farms, there should, at the beginning, be some clear understanding as to the treatment the milk is to have before it leaves the farm for the factory.

Firstly, I am a great believer in wiping the udder of the cow off with a damp cloth to remove any loose hair or dirt hanging to it, which without, will be sure to fall into the milking pail. The milkers should also wash their hands prior to milking, and at every time use every endeavour to keep foreign matter out of the milk. The milk having been taken from the cow, must be immediately aerated and cooled down, the diagram herewith shows the best utensil for the work.

By the use of this simple little contrivance, the milk will be ridded of all smells and taints, other than those aroused by contamination, and the milk will be found to keep much better, and gives the cheesemaker far more control over his work by receiving his milk in a more sweet condition. For this utensil to work most effectually, a supply of water should be at hand and be so connected as to pass into the aerator through the coil of pipes and out again as shown on the diagram.

A good cloth strainer is, of course, fixed to the top of the receptacle containing the milk on the stand. It is of no benefit to use this machine unless it is used in a good, clean atmosphere, if otherwise amongst dirty surroundings, or exposed to dust, etc., it may do more harm than good.

In the case of evening's milk the same holds good, only for the milk to be kept in a good condition for cheese-making next morning, it should be kept as cool as possible. The best plan is, if possible, to stand the can containing the milk in running water, or if that is not available, in a good

body of clean stagnant water. To keep down the temperature must be the great idea, and if the milk is properly clean and well aerated, I have no fear of being able to use the milk from the night before for cheese-making, but to do it, care and attention will certainly have to be exercised, or the milk will arrive at the factory in a condition too ripe to be of any use to a cheesemaker.

No preservative of any description must be added to help to keep the previous night's milk in order to send to the factory in the morning.

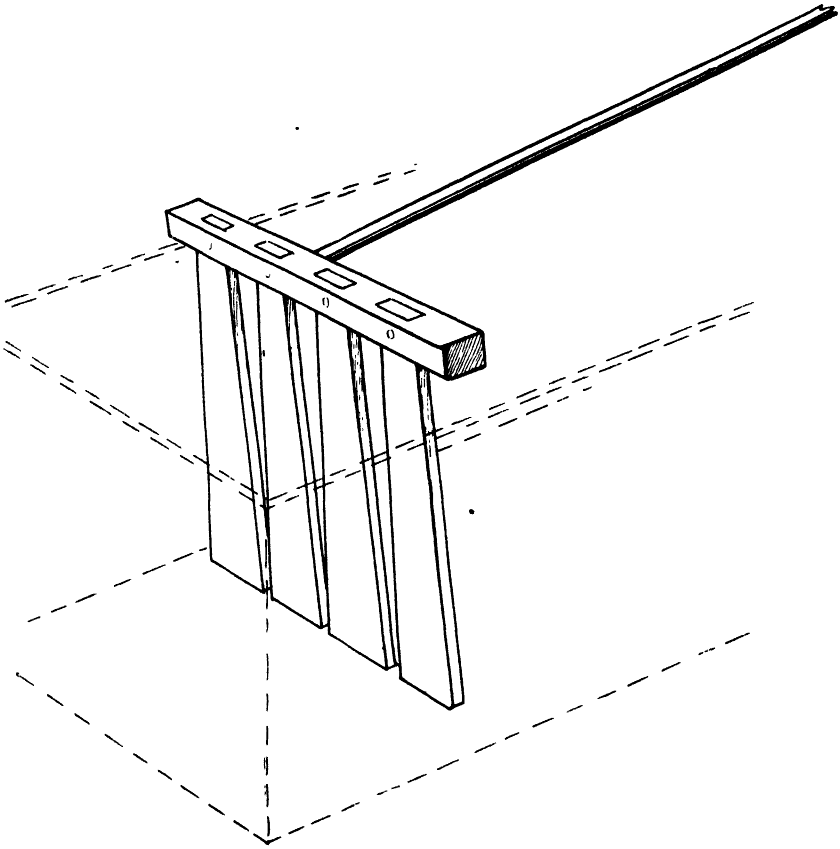


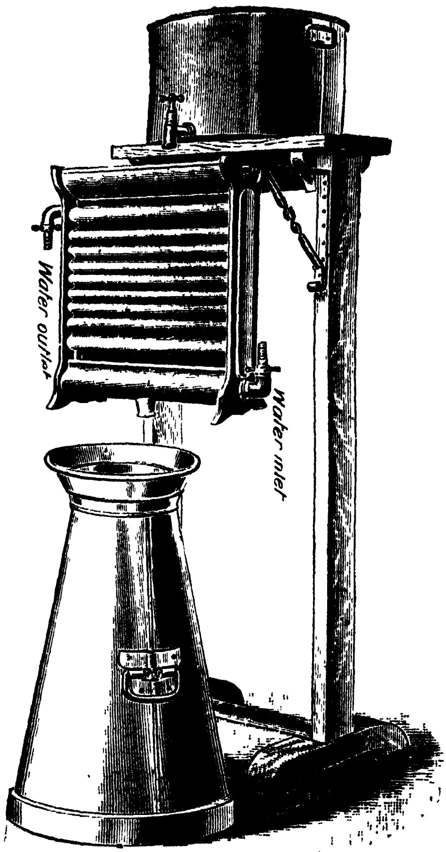
DIAGRAM OF CURD RAKE.
The teeth of which are to be made a little higher than the inside depth of the vat.

The milk standing at the kraal must be protected from dust as much as possible by covering the receptacles over with a clean cloth, which will also act as a strainer.

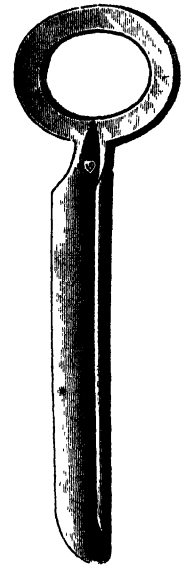
The milk should be delivered to the cheesemaker as soon as possible, he is then far more able to control the manufacture. And on no account whatever must it be permissible for the can used for the conveyance of milk to be used for the whey. This is often done, and is most dangerous to the milk; besides, the life of the can is shortened on account of the action of the acidity. Cheesemakers should note this carefully, it is a common practice but should be stopped forthwith.

The cans of milk while being delivered to the dairy should be covered from the sun.

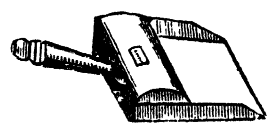
It is highly necessary and essential that in the formation of any cheese factory that a stipulation should be made that certain regulations in regard to the treatment and care of the milk be made and that they be



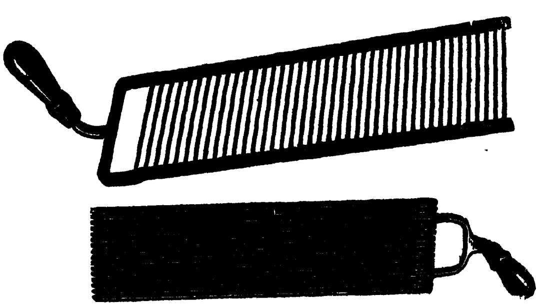
Milk Aerator and Cooler.



Cheese Borer or Taster.



Curd Scoop.



Curd Knives.

most stringently and honestly carried out, as in the supply of pure, fresh milk lies the crux of the whole thing, and it is perfectly impossible for the best cheesemaker to manufacture an even quality cheese throughout the whole season if the milk supplied to him is not good.

According to the statistics as published by the S A. Statistical Bureau for the year 1906, it will be seen that the importation of cheese alone into this country was enormous, amounting to 3,556,446 lbs. and £95,294 in money value, which in itself will clearly prove that in order to cope with our importations we shall have a very large quantity to turn out annually. At present for this season I do not estimate our output will be more than 180,000 lbs. to 200,000 lbs. at the most. Another most encouraging feature that I notice is that where cheese is made the consumption locally has greatly increased, and where cheese before was hardly ever eaten, now that it is made locally, it is to be found on almost every table. This goes to show that when the industry is established our consumption will far and away exceed that of the importation. Cheese is without doubt one of the most wholesome of foods, and should have greater prominence on our tables than at present, and I look to the time when it is made locally and when a good, sound merchantable article is placed upon our markets, that it will receive its proper recognition

There is also a greater output of cheese from a given quantity of milk than of butter. One gallon of milk will produce sufficiently close for estimation, 1 lb. of cheese, whereas with butter it takes on an average from 2½ to 3 gallons of milk to produce one pound of butter. There is certainly more work with cheese, but I consider that where sufficient milk say 200 gallons and upwards per diem can be collected, it pays the farmer or company of farmers, to employ a man to make it, and, therefore, do away with all work attached to it.

Another very profitable side of cheesemaking is the resultant whey which forms a most excellent pig food, and pigs properly camped off pay handsomely equally well, and if not better than anything on the farm in proportion to the capital invested Pigs allowed to run at their own sweet will all over the farm never pay They are a source of annoyance at every turn, and do far more damage in every way than the profit they bring in; but properly camped off they do exceedingly well, and I know of cases where the profit on the pigs is sufficient to pay the current expenses of the cheese factory.

New milk or "Beestings" must on no account be supplied to the cheesemaker, as, owing to its composition, it has a most deleterious effect on the process. It must be at the very least a week or ten days before it is added to the bulk, or longer, if it is noticed that up to this it has not yet resumed its normal condition. Great care must be shown by farmers in this respect, as it will be impossible for the cheesemaker to turn out a satisfactory article.

Process of Manufacture

Rennetting.—The milk upon its arrival into the cheese dairy is tipped at once through the strainer into the cheese vat, and in the case of milk being bought from neighbouring farmers, is weighed and the owner is credited with the exact weight of milk supplied. Each lot should be examined carefully to see that it is in good condition before being tipped into the vat through the strainer. Great care should be exercised to ascertain the exact condition of the milk, as ripe, gassy, or bad-flavoured milk will have to be treated accordingly, as the process of cheesemaking is purely one of fermentation, and therefore the most important point to the maker is knowing exactly what condition his milk is in that he may have full control of the lactic acid. The treatment of over ripe milk will be explained later.

In the case of evening's milk it is always better to roughly skim off the cream that has risen during the night, and heat it up to about 90° Fahr., stir well and add again to the milk.

Colouring.—Cheddar cheese requires a certain amount of colouring added in order to make the cheese of a more appetising and richer appearance. The colouring should be added prior to rennetting, and can conveniently be added during the time that the temperature is being got up to the requisite rennetting temperature.

The amount of colouring to be used will vary according to the market requirements, but I have found that the amount as shown on the table given will be ample, but of course makers must use their own discretion. The colouring should be diluted with about twice its volume of water and well stirred in.

TABLE FOR COLOURING.

Gals.	Drs.	Mims.	Gals.	Drs.	Mims.	Gals.	Drs.	Mims.	Gals.	Drs.	Mims.
1	...	3	50	2	40	100	5	23	150	8	..
3	...	9	52	2	46	102	5	29	152	8	7
5	...	15	54	2	52	104	5	36	154	8	13
7	...	22	56	2	59	106	5	42	156	8	20
9	...	28	58	3	6	108	5	46	158	8	26
11	..	33	60	3	12	110	5	49	160	8	33
13	..	40	62	3	19	112	5	55	162	8	39
15		48	64	3	25	114	6	2	164	8	45
17	..	54	66	3	31	116	6	9	166	8	52
19	1	.	68	3	38	118	6	15	168	8	59
21	1	3	70	3	44	120	6	23	170	9	6
23	1	9	72	3	51	122	6	29	172	9	12
25	1	20	75	4	..	124	6	33	174	9	19
27	1	25	76	4	3	126	6	38	176	9	25
29	1	33	78	4	9	128	6	45	178	9	31
31	1	39	80	4	16	130	6	52	180	9	38
33	1	45	82	4	23	132	7	6	182	9	44
35	1	52	84	4	29	134	7	12	184	9	50
37	1	58	86	4	36	136	7	19	186	9	56
39	2	3	88	4	42	138	7	25	188	10	3
41	2	9	90	4	49	140	7	33	190	10	9
43	2	15	92	4	55	142	7	38	192	10	16
45	2	22	94	5	2	144	7	44	194	10	23
47	2	28	96	5	9	146	7	50	196	10	29
50	2	40	98	5	16	148	7	55	200	10	40

As soon as all the milk is in, apply hot water through the jacket, or in the case of steam connection turn on steam slowly and heat up to the rennetting temperature, stirring gently all the time to prevent cream from rising, and allow of equal heating. The temperature to which it is best to add the rennett is more or less, in the case of good milk, controlled by the surrounding temperature of the air; from 84° to 86° Fahr. being best, in summer at the lower temperature and according to temperature of the air so increase up to 86° Fahr. Immediately this has been done, it is necessary to find out the degree of acidity in the milk, and this is done by what is often called the "Acid or straw test," apparently receiving the second name because a piece of straw is used in order to facilitate the determination of exactly knowing when the milk commences to coagulate. This test is carried out as follows: Take 4 oz. of milk from the vat at the temperature at which the rennett is to be added, measured by an ordinary 4-oz. chemists' phial, then throw the milk into an enamel cup; then add 1 drachm of rennett and note exactly how long the milk takes to thicken. The easiest plan to determine this is when adding the rennett, stir vigorrously for five seconds, giving the milk a revolving motion in the cup, then add a small piece of straw or match, which will be carried round with

the motion of the milk, and as soon as the match or straw stops revolving, the milk will have coagulated. This should take from 21—23 seconds, but one must be guided by the season of the year, the condition of the milk, and the maker in practice will soon find out as to when to allow for a second or so above or below. However, as soon as the desired test has been reached, no delay should occur in adding the rennett and proceeding with the process The amount of rennett required to thicken the milk to give a curd of the requisite firmness is about 4 oz. to the 100 gallons; by the table for rennetting it will easily be seen the proper quantities to add from 1 gallon up to 200

TABLE FOR RENNETTING.

Gals.	Ozs	Drs.	Mims	Gals	Ozs.	Drs.	Mims	Gals	Ozs.	Drs.	Mims	Gals.	Ozs.	Drs	Mims
1		..	19	50	2		..	100	4	..	...	150	6	...	..
3	.	...	57	52	2	..	38	102	4	...	38	152	6	...	38
5	..	1	36	54	2	1	16	104	4	1	16	154	6	1	16
7	...	2	14	56	2	1	55	106	4	1	55	156	6	1	55
9	..	2	52	58	2	2	33	108	4	2	33	158	6	2	33
11	...	3	31	60	2	3	12	110	4	3	12	160	6	3	12
13	..	4	9	62	2	3	50	112	4	3	50	162	6	3	50
15	. .	4	48	64	2	4	19	114	4	4	19	164	6	4	19
17		5	26	66	2	4	57	116	4	4	57	166	6	4	57
19	.	6	4	68	2	5	36	118	4	5	36	168	6	5	36
21		6	43	70	2	6	14	120	4	6	14	170	6	6	14
23		7	21	72	2	6	52	122	4	6	52	172	6	6	52
25	1		.	75	3	. .		125	5	.	...	175	7	.	..
27	1	..	38	76	3	. .	19	126	5	.	19	178	7	.	57
29	1	1	16	78	3	...	57	128	5	.	57	180	7	1	36
31	1	1	55	80	3	1	36	130	5	1	36	182	7	2	14
33	1	2	33	82	3	2	14	132	5	2	14	184	7	2	52
35	1	3	12	84	3	2	52	134	5	2	52	186	7	3	31
37	1	3	50	86	3	3	31	136	5	3	31	188	7	4	9
39	1	4	19	88	3	4	9	138	5	4	9	190	7	4	48
41	1	4	57	90	3	4	48	140	5	4	48	192	7	5	26
43	1	5	36	92	3	5	26	142	5	5	26	194	7	6	4
45	1	6	14	94	3	6	4	144	5	6	4	196	7	6	43
47	1	6	52	96	3	6	43	146	5	6	43	198	7	7	21
50	2	.	.	98	3	7	21	148	5	7	21	200	8	...	...

The rennett should be well diluted with cold water, in order that the cold temperature may retard the action of the rennett until it is thoroughly mixed with the milk, the diluted rennett is then added, and the whole well stirred for about five minutes, to thoroughly mix and also to prevent the cream from rising. Care must be taken not to stir too long, as the quantity of rennett added ought to start coagulation in about twelve to fourteen minutes, and if stirring is going on, or any heavy movement of milk in the vat at the time coagulation commences, a very great loss of fat will ensue together with a loss of curd.

Starters.—The use of a starter is to be most highly recommended. A starter is in reality an inoculation of the milk with a lactic ferment that has been prepared from properly sterilised milk, and at the same time been prepared in a pure, sweet atmosphere, free from taint or contamination in every way. By the use of a starter the maker is assured of having a preponderance of lactic acids germs over others, which will assure him of success and give a cheese of more full flavour and better in every way. The old-fashioned idea of using old whey from the day before is not only dangerous but should not be followed at all, the present system of Culture

Starter having completely superseded it. The great drawback to whey is that it is bound to be full of all sorts of adverse germs, and it cannot be a clean inoculation so to speak, and what is very dangerous is the possibility of whey from one day's bad or indifferent cheese, inoculating the fresh milk with deleterious germs.

The culture required to produce this starter can be procured in the form of a dry lactic ferment, it is in the form of a powder purchased generally in bottles, the process is to take about a gallon of fresh sweet milk and sterilise it by heating to about 180° Fahr. and keeping it thereabouts for at least fifteen minutes, and cool to about 75° Fahr., then add according to directions sufficient to produce coagulation in about 24 hours. When coagulated, add about 10 per cent. of this to a similar amount of sterilised milk and set aside for coagulation, repeat the process again, when the starter should be ready for use.

From 2 per cent. to 5 per cent. should be sufficient to add to the milk in the vat for cheesemaking, according to conditions.

Keep the temperature of the starter as near 75 degs. as possible.

In order to keep the starter going from day to day, it will be necessary for the cheesemaker to propagate the starter every day from the one day's starter for the next day's requirements.

A good starter should have a smooth, glossy, velvety appearance, and have a mild lactic acid flavour, clean and sharp to taste, in fact to many it makes quite a pleasant drink

The starter should not be allowed to get too old, if it is noticed that it is what is termed "going off" make a completely new starter. Be careful not to have the starter over ripe, or the vitality will be destroyed, and do not use too much. And above all things never add a cold starter to warm milk; always heat up to the temperature of milk in the vat, and without fail always strain starter through a fine cloth into the milk.

The best kind of vessel to propagate a starter in is a stone jar, well glazed inside, without chips.

(To be Continued.)

STALL FEEDING OF SHOW STOCK.

By "A South African Breeder."

At a meeting of the Zwart Ruggens Farmers' Association, held last month, some of the members discussed at length the above subject, and from the fact that they resolved to send a full report of their discussion to other associations, it would appear that the majority, at least, were satisfied that the views expressed were correct. Nevertheless, these enlightened and progressive members might well have taken a broader view of the question. The matter is a most important one, and only good can result from free discussion, but it is a subject on which anyone can easily be led astray by specious argument.

The resolution carried expressed the opinion that all prizes offered for sheep and goats should be duplicated, that is stall-fed, and veld-fed.

Classes for unhoused animals are well worth trying, and will, no doubt, be provided at some shows next year. It is doubtful, however, if many societies will face the increased expenditure necessary to provide duplicate classes for veld-fed throughout these sections. Such classes, also, would be but poorly filled at the bigger shows, as really veld-fed stock can only be exhibited at a local one-day show, owing to their being unaccustomed to confinement and artificial food

This resolution, however, as that passed by the Agricultural Union urging the providing of classes for unhoused stock, is of minor importance. The main point is, that the tenor of the discussion by the members, with one notable exception, went to show that they wished their opinion to go forth to the general community that stall feeding of breeding stock unfitted them and their progeny for profitable farming purposes in this country. The position which was taken up appeared to be, that any alteration in treatment to that which obtained in general practice was detrimental to the animals concerned, more especially Angoras, and to any progeny which would have to exist under the usual conditions. Yet feeding on lucerne was considered admissable Taking the main view as correct, it would appear that of the two, the animals fed in the stall on, say, oats, bran, and some green food, and made to take some exercise daily, should be better fitted to get veld stock than one kept in a small lucerne camp, where it quickly satisfies its hunger and then rests.

But do these members want to breed only such stock as can live under what are worse conditions than the original wild fauna had to contend with? Have they no desire to improve their methods at the same time as they improve their stock, always with a view to greater returns from the soil? I feel sure they have, but the discussion certainly gives one a different impression.

It was stated that the Angora is the only animal that breeders have been able to improve in this country on the natural veld, and that sheep-breeders were still compelled to import to keep up the standard of their flocks.

Possibly the breeders of Persian sheep (and even the users of mohair) may not endorse this. But, suppose we grant it. Well, there is a very good reason. The Angora comes from a land where no scientific breeding is practiced. Very possibly, also, the conditions obtaining here are better than in its native land. If the goat-breeders could go to another country

and get reliable stock from reliable breeders, even if this stock were no better than their best, they would do the same as the sheep-breeders do. The greatest improvement in Angoras has taken place also of recent years, and it is a curious circumstance that it appears to have gone on hand in hand with the better treatment of stud animals, whether for show or otherwise.

It is not easy to see either where the parallel between horses and goats ceases to exist. Take a thoroughbred foal born in England of strong, and speedy parents, which have been living a life of ease at stud for perhaps years previous to his birth; this horse will be as his parents were when he is put into training, and if brought out here and kept in a stable, will sire from a mare kept at her ease, an animal that will prove its stoutness when called upon to do so. Good food, of course, is essential in the improvement of any living thing. We can improve by selection up to a certain point, but the limit is strictly fixed by the available food supply. If we take animals that are practically natives to this country, and which live wholly on the natural veld, such as the Basuto pony, the Boer goat, the Cape sheep, and the Africander cattle, we find that, though as a rule the male animals are selected for some good reason, yet no improvement takes place as a whole; in fact, I believe they have rather deteriorated than otherwise on what they were, say, forty years ago, owing it may be to the natural pasture having deteriorated. This only goes to show that the limit of improvement has been practically reached under perfectly natural conditions.

The Basuto pony, we are told, is being now improved by the introduction of Arab stallions. The Boer goat is being improved, one hears, in milking qualities, by the introduction of Swiss blood. In another twenty years Africander cattle will be greatly improved. They will be stronger, heavier, better milkers, quicker breeders, less wiry, but more profitable. This will be brought about by better feeding (principally of the bulls) as well as selection, and getting exhibits up for shows will help greatly to this end.

Hardiness—that is the quality which enables animals to endure privation, exposure, and fatigue, at one and the same time—is the outcome of the natural survival of the fittest, or selection by man of those which appear to thrive best under severe conditions. One will find that their profitableness is practically limited to the one point of reproduction of their kind, or it may be in labour which calls specially for this quality of hardiness. In times of ease and plenty, it would almost appear as if their system had become atrophied, or afraid to respond to this improved state of affairs, for fear of these times being merely temporary. If one could get these animals to do double work in producing a fleece, more size, or milk, as well as more of their own kind, their system would break down. They are not really robust or elastic in constitution, *i.e.*, ready to take immediate advantage of improved conditions. Such robust conditions can only be attained by a constant supply of good and proper food, over many generations. Cross these hardy animals with a strong constitutioned one, and we get at once a very fine class of stock; continue this crossing, and provided we have a good constitution with its natural good qualities on the one side, and some hardiness consequent on the ruling mode of life on the other, we can continue for a long period to produce a very profitable class of stock; but the more one demands in profit the more one must give in attention and food. Without this robustness, the outcome of care, on the one side, the animal has a very limited sphere of work before it.

If both sexes are kept for many generations exclusively on the natural veld, our horses would all become Basuto ponies, our cattle would revert to the present Africander type, our sheep and goats would deteriorate from

what they now are. Then, if we use sires that have been well treated, and come of similar ancestors, improvement will at once set in again. I can well imagine someone saying, "Yes, but they will not thrive so well on the veld."

My own experience has been, that any animal that has been well treated when young, whether imported or otherwise (even a few months preparation for a show makes a noticeable difference), will make a stronger constitutioned animal in after years on the natural veld, will live longer, and give better progeny, than the animal reared in a poor way under so called natural conditions. Our Boer goat is a hardy animal, but is not profitable, and the best milkers are less hardy. The Cape sheep gives no fleece, but is not a strong animal. Africander cattle give small returns, but are weak in constitution, though generally spoken of as hardy. The Basuto pony is hardy, but one sees many weeds. Even with the human race, a native will stand less real privation than a well-fed white man. One thing they all excel at, *i.e.*, travelling long distances for their food and water. At present all our stock do too much walking; they, like some of their masters, are always looking for something better ahead in place of making the best use of what lies at their feet. As farms become fenced up and herding a thing of the past, the stock will devote all their food to profitable uses, instead of as now a very large proportion to repairing wear and tear.

Therefore travelling qualities, though important, should not take the first place.

Besides, as mentioned above, the foal born of parents kept temporarily at their ease will develop equal speed and staying powers when put into training. I can give another, and stronger, instance of which I have personal knowledge. A farmer started twenty-three years ago with a mixed herd of cattle, mostly of improved type. He used purebred Hereford bulls, and these were kept more or less in the stall. The crossbreds, as time went on, showed equal ability to forage for themselves, and gave a much greater return. Not surprising, perhaps, because Herefords are noted as being good travellers and foragers, though bred for many generations in small paddocks and stalls. Then this farmer gave up using Hereford bulls, and substituted purebred Jerseys, also kept partially in stalls. Now Jerseys have been kept in an extraordinary artificial state for more than a hundred years, and are spoken of as delicate. I say it advisedly, there is no kind of animal which will give a greater return for food consumed, none which will respond more whole heartedly to good treatment. These traits can only denote a naturally good constitution. Well, the progeny of these Jersey bulls, and these grade Hereford cows, have proved exceptionally good foragers, and will climb any ordinary mountain to search for food, and do not feel severe droughts any more than the usual run of mixed cattle. They do not grow so big, nor are they often fat, because they are always in milk or heavy with calf, and this from a very early age. But keep them from breeding, or let them dry early, and they quickly put on flesh. Give them extra attention, and they respond at once, and they make quite double the use of the natural pasture than an Africander would, and the oxen stand farm work practically as well. Still, on our natural veld alone they, of course, fall very far short in produce of what they would do, say, under English conditions,and this is only to be expected. This can only show that stall-feeding does not necessarily unfit stock for veld purposes.

There is one great danger in the artificial feeding of stock which is not fully appreciated. There are many weakly animals born which, under natural conditions, would die off; but which by careful treatment will grow up apparently strong. These, if bred from, are sure to hand down their

weaknesses in greater, or less degree, to their progeny. The breeder will know these, but the purchaser may have a difficulty in detecting them, until he has taken them home and put them to the test. Had the members of the Zwart Ruggens driven home this point, both to the breeders, and judges at shows, urging that greater attention be paid to robustness of constitution, one could only have agreed most heartily. An example ever before us, is amongst our most highly civilised fellow men, where careful nurture ensures the development of such weaklings, only to hand down an ever-increasing band of delicate unsound children.

If a breeder deliberately pampers his breeding animals, whether for show or otherwise, the result will only recoil on himself. Many farmers now refuse to purchase certain stud animals, because their owners pamper and unfit them for profitable use.

Still many of the show animals of England, which have been pampered from their birth, have splendid constitutions, and will give strong progeny; but, of course, there is a certain risk in using such. In this country our stud animals suffer far more from under, rather than over, feeding.

Our show societies should aim to foster the improvement of stock by better treatment as well as by selection, and I maintain that the offering of prizes for veld-fed stock is a retrogade step, and calculated only to retard improved methods.

Unhoused, or unblanketed stock, is on a somewhat different footing If the system is to be tried then the term veld-fed will need defining. Animals fed in lucerne camps, or lands on turnips, etc., or even reserved camps of natural veld, will have an advantage; and according to the arguments advanced by supporters of the system, will not prove what the animals can do on the open veld in large flocks. The idea appears impracticable, and will only act as a temptation to some to stretch the term veld-fed to beyond its utmost limits, and be the cause of unjust suspicion being cast on others. In any case only a few classes should be provided at first, and I will venture to prophecy that most of the prize winners in such classes will be the descendants of stall-fed stock.

EXPERIMENTS WITH OSTRICHES.

III.

THE INFLUENCE OF CLIMATIC CHANGES ON FEATHER GROWTH.

By PROFESSOR J. E. DUERDEN, Rhodes University College, Grahamstown.

It is generally conceded that defects in ostrich feathers are likely to appear whenever a bird from one cause or another becomes reduced in condition or experiences some sudden check in its growth, but how readily responsive the bird is to sudden changes in its external surroundings is not always appreciated. Such obvious cases as defects resulting from accidents, scarcity of food, or a complete change of surroundings are well established, but not the less conspicuous ones which may result from ordinary climatic changes A very marked instance of this kind, involving the production of defects as a result of inclement weather, has recently occurred, and is of such a decided nature as to be worth while placing on record in the attempt to build up a South African literature on the physiology of the ostrich in health and disease.

Around Grahamstown the 5th and 6th days of May were much colder than usual, the thermometer dropped below 50° F., and heavy southwest rains prevailed, especially during the two nights. For some days previously the autumn weather had been bright and clear, warm during the day, though cool at night The sudden fall in temperature, accompanied by drifting rain, was just such a combination as is very trying to the constitution of human beings or animals exposed to it, and as an experiment on the influence of such conditions on the feather growth, it was decided to subject some ostriches to the adverse climatic conditions, and to protect others by keeping them under shelter. At the commencement all the birds were in an equally good condition of health.

An adult cock and hen were accordingly left exposed all the time, while three cocks, about seventeen months old, and two chicks, about six months old, were kept under cover each night, and the greater part of the day, and fed artificially. The birds were then carefully examined on the 8th May, two days after the spell of cold wet weather. In this interval the actively growing wing feathers had protuded nearly half an inch further from the socket, such feathers usually growing at the rate of a little over one inch per week. Any new defects, therefore, would be seen a short distance above the socket.

In the case of the adult cock bird the wing feathers were all at an early stage of growth, extending beyond the sockets for about three inches. Previously they had shown none of the circular constrictions which on the unopened feather indicate where bars will occur when the feather is fully opened, but now nearly all the growing feathers showed a very marked indentation about half an inch beyond the socket. Evidently the constriction represented a pinching to which the soft growing feather had

been subjected during the inclement weather, and from the known rate of growth this must have taken place at or near the mouth of the socket, not below.

The feathers of the adult hen bird were next examined. These were a little over three-quarters grown, and all were previously destitute of bars, but now the majority showed a circular constriction at about half an inch beyond the socket, that is, in about the same relative position as those in the feathers of the adult cock. The constrictions undoubtedly represented the part of the feather forming at the mouth of the socket during the boisterous weather; it had been pinched, and now grown beyond, the compression still persisting.

The three cocks which had been fed and kept under cover for two nights and a day during the most trying part of the rainy period had also their whites at about three-quarters growth, most of them altogether free of bars. On examination it was found that none of these feathers showed any indentations in the region of new growth, such as were present on the exposed cock and hen. Evidently the protection afforded them had sufficed to prevent the formation of bars. Of the two younger chicks, the one had nearly ripe spadonas, and almost all these showed feeble constrictions a little above the socket. In the second chick the spadonas had been cut a month before, but the feathers under the quills were still in a growing condition. On these a broad indentation occurred on nearly every feather, situated at half or three-quarters of an inch from the socket.

As a result of these experiments, conducted under known conditions, we have very definite evidence as to the direct influence of severe climatic changes upon the feather growth in ostriches. Even where the birds are in excellent condition, and the feathers growing uniformly, a sudden advent of unfavourable weather may suffice to set up such changes in the physiology of the bird as to produce constrictions in the part of the feather developing within the socket.

The production of the constriction can be explained as follows. Exposure of the birds to a sudden chill caused a constriction of the superficial blood vessels, and resulted in a partial shrinkage of the highly vascular skin around the growing feathers while still in their soft plastic condition; this shrinkage produced a complete or partial constriction around the growing unopened feather, indicating where a bar would appear when the feather opened out at this particular spot. In the adult cock and hen birds exposed night and day throughout the cold period, practically all the soft growing feathers were affected, in three young cocks only partly exposed during the day no constrictions had taken place, and in two chicks also partly protected constrictions were produced, but not so marked nor so plentiful as in the exposed birds.

It must be observed that constrictions would not be likely to appear on ripe or nearly ripe feathers. In these the feather at the socket has become so hard and firm as not to yield readily to any shrinkage or compression from the lip of the feather socket, whereas the soft growing feathers are very easily pinched, and do not recover when they have extended beyond the socket. The bar in the fully developed feather results from defective growth during the soft growing stage, hence it is during the latter period that all efforts should be made to protect the bird against vicissitudes. Bars will not be produced during the ripening of the feather and quill.

The production of constrictions on the soft unopened feather can be further illustrated from what we know to take place in human beings when exposed to cold bleak weather, especially if accompanied by an insufficiency of food and clothing. The skin loses its fulness and roundness

EXPLANATION OF PLATE.

Early feather from cock ostrich, plucked a fortnight after exposure of the bird to inclement weather. The deep ring at the place where the feather is opening out was produced during the cold, rainy night of the 27th May, and the less deep one just above on the night of the 26th May. The two bars in the part of the feather already opened out correspond with previous exposures of the bird to inclement weather.

and partly shrinks over the bones, giving a pinched appearance to the individual. If such a shrinkage took place over any soft plastic substance, it is manifest that the latter would be compressed, and its shape altered, perhaps to recover when favourable conditions returned. This would seem to be precisely what occurs in the production of bars in ostrich feathers under chilly conditions. The skin constituting the feather sockets shrinks, due to a diminished blood pressure, and the shrinkage presses in a circular manner upon the soft tissue of the unopened feather, thereby producing a constriction, then as the feather continues its growth, being pressed out from below, the constriction comes into view, but unfortunately fails to recover. When the part of the feather where the ringed compression occurs comes to open out, we find that the feather is defective at that particular spot; less feather material has usually been produced, and the barbules do not freely separate from the barbs, and even the central shaft may show a notch, in other words, we have the familiar bar.

As every farmer knows, the domesticated ostrich does not always show sufficient instinct or intelligence to seek protection against the inclemency of the weather, like most other birds and mammals. He will almost as readily crouch down on the most exposed spot as try to shelter behind or underneath some bush, and if once crouched, he rarely moves until the downpour ceases; moreover, in cold wet weather he eats less freely. Under these circumstances it can readily be understood that two or three days of exposure and partial abstinence from food will influence his condition, however favourable this may have been at the beginning, and result in a partial pinching of the skin, which leaves its mark upon those feathers which happen to be in a soft growing state Intense cold alone does not appear to have much influence, but the feathers seem an insufficient protection when the cold is accompanied by prolonged rains.

The above experience clearly demonstrates the possible influence of inclement weather upon the growing feathers of the ostrich, and suggests that protection should be afforded the birds under such conditions. A single experiment is of course insufficient upon which to base any broad generalisations or recommendations, but it strongly enforces the need of further investigations along such lines. It further suggests a comparison between the high dry regions of the Colony and the more moist coast regions as regards their suitability for ostriches No doubt observations along these lines have been made by many ostrich farmers, and it would be well if these were placed on record

The production of constrictions on such a large number of feathers at one and the same time entirely disproves the opinion held by some that bars are altogether due to the presence of mites, to the bird pinching its own feathers, or to a continued low condition of health. Rather they are more likely to be produced by any sudden change or alteration in the condition of the bird, whether such be in the surroundings or within the bird itself. Climatic change is of course only one among a number of possible causes of the defects The final solution of the problem will be the determination of all the causes, and the various remedies therefor.

Since the above was written, a second favourable opportunity occurred for observing the influence of inclement weather upon the feather growth of the ostrich, and has yielded even more striking and definite results. From about midnight on Sunday, May 26th, until Tuesday afternoon, May 28th, Grahamstown experienced a very cold snap, accompanied by heavy drifting rain. Apparently the change was general throughout South Africa, for on the 28th the papers reported that snow had fallen in various parts of the Colony and that the lowest known temperature at Durban was recorded on the night of the 27th, namely 42° F. At

Grahamstown the temperature on the evening of the 26th fell below 50° F., and a cold rain commenced shortly after midnight, the rain still falling at 8 a.m. on the 27th, with the thermometer at only 40°. During the 27th the temperature remained at about 45° all day, with heavy rains and strong winds most of the time. The night of the 27th was very stormy, rain falling practically all the night, with the thermometer as low as 38°. This was also the temperature at 8 a.m. on the 28th, and rain continued nearly all the morning, the temperature rising to 48° at noon. In the afternoon the sky began to clear, and the succeeding night was calm and clear, with the thermometer at 42°. On the 29th the day temperature began to rise, reaching 67° in the shade, the night temperature falling to 42°. Thus the cold rainy weather continued from about midnight of the 26th until the afternoon of the 28th.

For purposes of the experiment, the four six-month ostrich chicks previously referred to were kept under cover on the night of the 26th, and the three eighteen-month cocks were protected from early morning on the 27th, while the adult cock and hen were left exposed all the time to the drenching cold, as would be the case on all ostrich farms. The birds under cover were kept there the whole of the 27th, and fed artificially; they were allowed out on the afternoon of the 28th, when the weather cleared, and housed again at night. On the 29th all the birds were fully examined to see if their growing feathers showed any bar constrictions as a result of the unfavourable climatic conditions of the two previous days.

The results of the examination were conclusive. Not one of the feathers of the birds which had been kept under cover showed any defect in their new growth, likewise the hen which had been left exposed, but *the feathers of the exposed cock bird all showed either one or two very deep rings immediately above the socket,* rings which indicated that as the feathers opened out they would be replaced by most conspicuous bars. The measurements made, and the data in hand as to the rate of feather growth, clearly indicated that the first of the two rings corresponded with the cold night of the 26th, and the second of the two rings with the boisterous night of the 27th; the interval between the two, namely three-sixteenths of an inch, represented the length of the growth of the feather during the day. Not only were the whites all constricted, but also all the blacks which were in a growing stage. The first ring was nowhere so deep as the second, and where only one occurred it corresponded with the stronger second ring. The exposure during the first night was by no means so severe as that during the second, hence the difference in the result.

The question will naturally be asked, why should the feathers of the cock bird be thus pinched, and not those of the hen bird, seeing that both were exposed to exactly the same unfavourable conditions? The explanation seems simple if we consider the different stages of growth of the white feathers of the two birds. The plumes of the cock were, at an early stage of their growth, extending from the socket not more than six inches, while those of the hen were nearly full grown. Every ostrich farmer knows that feathers are more frequently barred towards the tip than in the middle and lower parts. This arises from the fact that in the early stages the unopened part of the feather within the socket is more plastic than the part which forms later; the later growth is stronger and firmer, and therefore less likely to be compressed by any shrinkage of the mouth of the socket, according to the method described in the first part of the paper. In the two cases under consideration, therefore, the pinching of the feather socket was able to indent the young soft feathers, while the firmer, more nearly ripe feathers resisted the compression, and were thus saved from the production of defects.

Of course, there is an enormous amount of variation in the responsiveness of the different growing feathers of the same bird, and also of different birds. Even in the feathers of the cock bird some only showed one constriction, though most showed two, proving that not all were influenced alike. Much has, no doubt, to be allowed on account of the individual bird and its condition for the time being, and it does not follow that conditions which will produce defects in one bird will do so in another, or even in the same bird at different times.

The idea of the marked individuality of the ostrich as regards responsiveness to conditions received a certain confirmation from the covert feathers, "shorts," of the cock and hen exposed. In the cock the soft growing feathers among these were indented, as already remarked, while none of them so suffered in the hen, though a number of drabs were at an early stage of growth. Questions of this kind are clearly not so simple as may appear at first sight, and in any deductions, it behoves one to be extremely careful that all the circumstances have been taken into account.

The experiment, however, demonstrates beyond any question that bars, and very conspicuous ones, may be produced in ostrich feathers by exposure of birds to inclement weather. There is little doubt that this is the explanation of the greater prevalence of defects, which is stated by many to have occurred during the exceptionally heavy rains of the two past seasons, an occurrence which seemed all the more difficult of solution from the fine condition of the held and pastures at the time.

Conclusions

1. Ostriches, even in good condition, if exposed to inclement weather, may later show constrictions in their growing feathers, which constrictions will result in bars on the feathers unfolding. Birds kept under shelter during the same inclement conditions are not likely to produce defective feathers.

2. The exposure produces a contraction or shrinkage of the skin upon the soft growing feather, the latter being thereby constricted in a ring-like manner, which constriction fails to re-expand after the feather leaves the socket.

3. The skin shrinkage does not affect quills, and ripe, or nearly ripe feathers, as the quill is too firm and hard to respond to the pressure. Bars are produced during the soft growing period of the feather.

4. All ostriches are not affected alike by the same unfavourable conditions; some are very responsive, while others are very resistant.

"PLASMOPARA VITICOLA," OR BROWN ROT.

(By P. J. RETIEF and S. W. VAN NIEKERK, in *Ons Land*.)

On account of the calamity to which our farmers are exposed by the recently discovered disease "Plasmopara," or commonly known as "Peronospora," we think it will interest them to hear of some practical European experiences. It is scarcely necessary to enter into scientific details further than to enable the farmer to detect and combat the disease. There is probably less cause for anxiety with us than in the moist viticultural regions of Europe, yet, our farmers generally should gather an up-to-date and accurate knowledge of this disease in order to be prepared in time for its ravages, so that, if it should suddenly break out in his vineyard, he may be in possession of sufficient information to deal with the matter forthwith.

As is well known, Peronospora has its origin in America. Being discovered in France during the year 1878, it spread very rapidly over the whole of Europe, causing an enormous amount of damage in some of the wine-producing countries. In 1892 Portugal lost half of its vintage, and in 1895 Italy lost over two millions of leaguers. The damage caused in the German Rhine Province during 1906 is estimated at three-fourths of the whole vintage. These enormous losses were in each case due to the suddenness of the outbreak of Peronospera in the vineyards. Before the vines even started sprouting it was already too late.

The disease is really caused by a very minute plant belonging to the same family as the mould on our bread. Under the microscope one may observe the stalks like fine woolly threads, on which one notes the growing seeds, very much resembling young bunches of grapes. These seeds, or, as they are scientifically called, "spores," ripen, and then drop under conditions of dampness, etc., being conveyed from one leaf to another by wind, insects, etc. If such a spore during moist weather alights on the leaf, it soon after germinates, penetrating into the leaf, spreading and developing by means of what is called "the mycelium." This stage is characterised by a yellow spot on the leaf. Not until it is ready for propagation does it make an opening in the under surface of the leaf as a passage for the seed-sprouts. Thousands of these seed-sprouts appear on a very small surface and on each of them spores are developed, causing the spot to assume a white, flour-like appearance, whilst at the same time the yellow tint of the spot changes to a brown colour. It is a peculiar fact that the mycelium generally appears along the nerves of the leaf, eventually spreading in all directions and causing the leaf to drop. The vine may now be compared to a man suffering from consumption. The leaves are the lungs of the vine. Just like a man breathes through his lungs, a vine breathes through its leaves. Thus, when the leaf is diseased or has fallen off, the health of the vine suffers and it is unable to ripen either the grapes or the green wood. Consequently such grapes produce a very inferior wine or one only fit to be converted into brandy. Now, if the disease is allowed to spread unchecked for some years, the vitality of the vine will suffer to such an extent that recovery is a matter of the greatest difficulty.

The amount of damage caused by this disease depends on the prevailing weather and temperature. In wet weather, with a temperature of 20° C. and higher, Peronospora spreads very rapidly. With dry, warm

weather, on the contrary, it stops. Of equally great importance is the period at which Peronospora makes its appearance. If the disease appears either before, during, or shortly after flowering, the damage is always very great, for then the leaves offer still less resistance, and, as a rule, both the young bunches of grapes and the tender shoots are also affected. This does not happen when, for instance, the disease breaks out during the ripening of the grapes. Add to this the fact that the weather in these very months is often wet and rainy. If the disease comes late in the season, the loss is generally very small and insignificant. According to Mr. G. Farlow, the disease would rather be an advantage in the Eastern States of North America, as it appears late in the season, thinning out the leaves to some extent, and thus giving more light and air to the grapes, causing them to ripen better.

The combating of Peronospora is a difficult matter, there being no remedies, but only preventive measures. Peronospora should be killed before it has penetrated into the leaf. When the mycelium has once started its development in the leaf the latter is lost. Therefore those measures should be taken before the spores are given a chance to appear on the leaf. The main point in combating Peronospora is early spraying, so that when the spores make their appearance on the leaves the poison is already there. It has been found that in water containing very small quantities of lime, sulphate of iron, or sulphate of copper, these spores are unable to develop, but are destroyed; and these preventives are now in general use, either in solution or in the form of powder. Sulphate of copper-lime mixture is, however, most popular, and is recommended by the best authorities in France and Germany.

This mixture is applied in a solution of the strength of one-half to 2 per cent. At the first spraying a solution of one per cent. strength is recommended. This first spraying is best applied shortly before flowering or when the shoots are of a length of about nine to twelve inches. The second spraying, following shortly after flowering, consists of a two per cent. solution. A one per cent. solution has the same effect as a two per cent. solution; yet, it has been proved that the latter adheres much better to the leaves, and can stand more rain. But the leaves being still so young at the first spraying, it is advisable not to use such a strong solution. These two sprayings are, as a rule, sufficient, but should the weather be unfavourable, a third, and even a fourth, spraying may be necessary, in which case weaker solutions may be applied. In France an experiment was made with a view to determine which strength would adhere longest to the leaves. Towards the end of August one part in a certain vineyard was left untreated, another portion was sprayed with a one per cent. solution, and a third plot with a two per cent. solution. In the beginning of September there were a few rainy days, and again about the middle of the month. On the 20th of September it was found that both the untreated plot and the portion sprayed with a one per cent. solution were equally badly affected with the disease. On the other hand, the plot treated with a two per cent. solution was practically healthy.

Now, to effect poisoning of the Peronospora we may very well apply an ordinary solution of sulphate of iron. This material having, however, the effect of burning the leaves, it is necessary first to neutralise the acid by the addition of lime. By this addition of lime a bluish secretion of copper-oxyhydrate is caused. The oxyhydrates, however, are still sufficiently soluble in water to cause, under conditions of moisture, the destruction of Peronospora on the leaf. Moreover, this oxyhydrate adheres very strongly to the leaf, and is not easily washed away by rain.

The mixture should be most carefully prepared, as through carelessness its efficiency is either lessened or completely lost. It is prepared in the following manner:—If a one per cent. solution is to be made, take a tub in which, say, 100 gallons of the mixture can be measured off. Now pour 50 gallons of water into the tub, suspend in it overnight a small bag containing 10 pounds of sulphate of copper, and in another tub 10 pounds of lime in 50 gallons of water. The next morning the lime-water is thoroughly stirred, and by means of a fine sieve added to the copper sulphate while stirring continually. The mixture would now be neutralised. In order to ascertain whether it still has an acid effect, take some blue litmus paper. If the paper becomes red by contact with the mixture, the latter still contains some acid, and a little more dry lime is added until the paper becomes a faint blue. Both copper sulphate and lime should be of the best quality and the lime fresh and unslaked.

The same preparation can be made by using, instead of lime, soda (sodium carbonate). On account of the generation of carbonic acid, the use of litmus paper is here impossible. It is, therefore, necessary to adhere strictly to the formula, using the same weight of soda as of copper sulphate. A little too much soda, however, is better than an insufficient quantity, in order to make sure of the neutralising effect. This mixture, however, has the disadvantage of losing its power rapidly; it should, therefore, be applied soon after being prepared—in any case, within twelve hours of its preparation. The copper-lime mixture may, if necessary, be used for three or four days, yet we would advise always to prepare this solution immediately before applying it. Another disadvantage of copper-soda is that its effect on the leaves is difficult to estimate, the farmer being often unable to determine whether the work has been done in a thorough manner. Still, the mixture is used on many farms, as soda is more reliable than lime, and its preparation very simple; while the pumps are not so liable to be blocked up as in the use of copper-lime.

In additon to the above remedies, there are many others, which either are too costly or do not produce the same favourable results. Amongst these we may mention copper-ammonia (Eau céleste) and sulphur-copper powder as the most important.

The class of pump to be used depends entirely on the farmer himself. The ordinary knapsack pump, however, is in general use in Europe. The production of a very fine spray should be insisted upon, large drops very soon detaching themselves from the leaves. Thorough spraying of both leaves and growing bunches is of the greatest importance.

In conclusion, we cannot refrain from saying that the disease is most improbable under our climatic conditions. As already shown above, the Peronospora requires water, and, in addition, a moderate amount of heat. The latter factor is not wanting here. But we are very seldom troubled with too much moisture—at all events, within the boundaries of the Western Province.

Von Babo, an eminent German viticultural expert, mentions South Africa amongst all other wine-producing countries as having the driest weather during the summer months. So we see how improbable an outbreak of this disease is. But to set our hearts at rest in the midst of all the dangers threatening us, it is not our object to offer advice to the farmers, and therefore we hope that every farmer will acquire the knowledge which is indispensable for taking measures to combat the disease.

VINE AND FRUIT GROWERS' CONGRESS, 1907.

The Annual Congress of the combined Western and Eastern Vine and Fruit Growers was opened in the Town Hall, King William's Town, on Wednesday, May 15. Mr. J. Leighton, F.R.H.S., President of the Eastern Province Horticultural Board, was elected to the chair.

The following delegates were present: Mr. W. T. Leighton, Aliwal North; Messrs. J. H. Dugmore and H. Dugmore, Bathurst; Messrs. J. Landrey, jun., and T. Stephen, Cathcart; Mr. J. E. W. Venables, Chalumno; Mr. H. H. Hards, Grahamstown; Messrs. H. G. Flanagan and J. N. C. Hardwick, Komgha; Messrs. F. Ginsberg, M.L.A., James Leighton, F.R.H.S., and J. Hobson, F.R.H.S., King William's Town; Mr. M. H. Ella, Lower Cathcart; Major-General Sir E. Y. Brabant, M.L.A., Messrs. P. M. Kruuse, M. Davies (Central), and F. L. Lingwood (West Bank), East London; Mr. G. W. Turpin, Stutterheim; Mr. J. H. Laubscher, Graaff-Reinet; Messrs. O. Barry, O. E. Lange, Stellenbosch; Messrs. T. Micklem and A. C. Butler, Western Province Horticultural Board; the Hon. C. W. H. Kohler, M.L.C., and Mr. R. J. Bulmer, Paarl; Mr. D. J. Joubert, Ceres; Mr. Rooke, Tulbagh; Mr. F. Grace, Berlin; Mr. J. Slement, Gonubie; and Mr. A. Stegmann, Somerset East. Secretaries: Mr. A. A. Persse (W.P. Hort. Board), Mr. W. B. Goulden (E.P. Hort. Board). The Eastern Province Government Entomologist, Mr. Dewar, was also present.

THE LATE DR. HUTCHEON.

The Chairman said before proceeding to the business of the Congress, it was his painful duty to ask Congress to rise and express their sincere sympathy and a sense of their loss in the death of Dr. Hutcheon, Director of Agriculture. As they were all aware, their friend, Dr. Hutcheon, died yesterday at noon, and this not only affected this Congress, who would mourn his loss, but also all the farmers and horticulturists in the Colony. In Dr. Hutcheon's death the Colony had lost one of its ablest men, and he called on Congress to rise as an expression of their condolence with the relatives of the deceased gentleman.

The resolution having been passed in silence, Mr. Hards (Grahamstown) said the matter of sending a wreath on behalf of the united Congress had been discussed informally, and a wire had been sent to Cape Town, asking that a wreath be placed on behalf of Congress.

A WELCOME.

Mr. Leighton conveyed a most hearty welcome to the delegates from the Western Province, and expressed the hope that the visit to the Eastern Province would be a pleasant one, and that the business would be carried out in a harmonious way.

The Mayor (Mr. F. Ginsberg, M.L.A.) said he had, on behalf of the Town Council of King William's Town, to extend to the delegates a hearty welcome to the town. He was sure their deliberations would be of great benefit to the country, and he hoped their stay in King William's Town would be a pleasant one, and that they would be able to look back with kindly feelings to the Congress here. He had to introduce Councillors A. R. Burton, J. B. Byrnes and H. J. Ainslie.

Mr. Varder, on behalf of the Agricultural Society deputation, expressed his regret that their President, Mr. A. Everitt, was unable to be present, having gone to Port Elizabeth on business of the Society. He was very pleased to be able to welcome the delegates to the Congress. The Society they represented was a sister of the Horticultural Congress, and they naturally hoped the deliberations would be for the benefit of agriculture generally.

To these welcomes Mr. Leighton replied, expressing the sincere thanks of the delegates for the expressions of good feeling.

Dr. Brownlee (President of the local Horticultural Society) and Mr. James Sim (Acting Conservator of Forests) were then introduced by Mr. Leighton, and Dr. Brownlee, in a few well-chosen words, welcomed the delegates, expressing the hope that success would crown their efforts.

The Agenda.

Mr. Micklem and Mr. Hards were appointed a sub-committee to revise and classify the agenda.

An Invitation.

Mr. C. E. Dell (President of the King William's Town Farmers' Association) wrote inviting any members of the Congress who wished to do so, to visit Kei Road on Friday, when arrangements would be made for their entertainment. Those who desired to avail themselves of the invitation were asked to hand in their names to the Secretary as soon as possible.

Address by the Hon C. W. H. Kohler, M.L C.

The Hon. C. W. H. Kohler, M.L.C. (President of the Western Province Board) here read an address as follows:

It is with a sincere feeling of pleasure that I rise to deliver the Presidential address to a combined Congress of Fruit Growers, in one of the chief towns of the Eastern Province. When we inaugurated the first combined meeting of fruit growers thirteen years ago, predictions were not wanting that, like many organisations that had preceded us, we were going to be a mere flash in the pan. Thirteen years' labour for our industry still finds us going strong, and it is a gratifying fact that many of the men who started the movement are still working with us, and we all feel heartily pleased to see so many of them round us to-day. May they long continue their energetic disinterested efforts on behalf of our industry. All of us who hail from the West are pleased that this Congress is being held in the East. At one time it was said the East and West would not be able to work together. The Eastern men, however, set us a generous example, for they have attended no less than three Congresses in the West.

Town and Country.

Whilst we have only just awakened to a sense of our duty towards them, and I may say towards ourselves—for we have much to learn, and may pick up a wrinkle from our fellow-farmers in the East—they will find us all willing to profit by their experience. The past year has been an eventful one for the farming community; it has been one in which they have loomed largely before the general public, for, owing to the long continuance of the depression people have commenced to realise that permanent prosperity lies in the fostering of agriculture, for it does require to be helped on. There are so many plums to be picked up in the cities; life is so much more comfortable; there are so many more attractions, more advantages in the way of the children's education, etc., that it is only when the cities have proved unkind that men are prepared to go back to the land. As for those who go there from choice, for them there must be some kind of hope, some vision, even if seldom realised, that some day a competency will be theirs, that there will be some reward for their isolation and their toils. It is when you nurse agriculture, give it every possible advantage, that its prospects seem most alluring; it then tempts more energy and more capital. The result is increased production. The Ministry, guided as all Ministers are, by public opinion, have gone in for a farmers' programme, realising that investments in that direction will give the quickest and safest returns, not alone to the farmer, but to the whole community.

Liquor Adulteration.

The resolutions passed at your last Congress were brought to the notice of the Government by a Committee appointed by the Board of Horticulture. They were received by the Premier and the Secretary for Agriculture, were very sympathetically met, and you will note that most of your recommendations have been given effect to. As regards liquor adulteration, an Act was brought forward by the Ministry last session, and is now law. It is, however, being held back in conformity with the intentions of the Legislature that sufficient time should be given those firms whose stocks were not in accordance with the Act, to sell them out. Owing to the depression and restricted market, they have as yet been unable to dispose of those as speedily as they anticipated, and they have approached the Government for an extension of time. As many of the merchants are not in a flourishing financial condition, in the interests of the whole industry it would be unwise to force matters. The Government are quite at one with us in the matter of a South African research laboratory, and are taking steps to bring this about. As you requested, Government have restored the old rate of assistance to Agricultural Shows. The result has been to increase the number of small ones; whether the holding of such an increased number is going to benefit agriculture is a moot point, which should be thoroughly discussed by farmers themselves. As to the franking of letters by Secretaries of Associations, it was pointed out that the Agricultural Department had no power to allow it. The matter was entirely in the hands of the Postmaster General, who, on the grounds that he has to make his department pay refuses to carry further mail matter free. Should the financial state permit it later on, Government would not be adverse to giving a small grant to Societies for such a purpose. The Government favoured grants to Societies in aid of investigations; they would also be prepared to give grants for the purchase of agricultural books as soon as funds permitted. Owing to press of other Parliamentary work, the Seeds and Fertilisers Bill, although drafted, had to stand down, but there is every probability of it becoming law this session. In conjunction with the other Colonies, Government is taking steps to aid in the systematic extermination of locusts.

Dr. Hutcheon.

Almost immediately after the passing of your resolution *re* Dr. Hutcheon, his appointment was confirmed, but I regret to say that since his appointment the Doctor has been in very indifferent health. However, in spite of this, his influence on the Department is making itself felt, and is to be seen in the many practical ways that the Department is coming to the assistance of the farmer. There is no difficulty in getting to see the Doctor; his door was always wide open, and seemed to say: Walk right in. To-day we have heard the sad news of his death, and feel that we have lost a capable Director of Agriculture and a true friend: Owing to shortness of funds and two of the members of the Standing Commission on American vine stocks having left the country, the Government were unable to re-appoint the same. They have, however, appointed Mr. Tribolet, who will work in conjunction with the local Committees, forming the connecting link between them and keeping a record of the investigations.

The Analytical Department, being understaffed, have done nothing in the matter of analysis of soils. There was, however, such a fiasco in the analysis of wines after the last wine show that Government have realised the necessity of having an analyst for agricultural work only, and they have accordingly placed the services of one at the disposal of the Department. We may now reasonably hope that something may be done in the matter. Last year the Board of Horticulture recommended the sending of young wine farmers to Europe in order to study wine-making, with the object of lecturing to and instructing their fellow-countrymen on their return. The Government have since acceded to this request, and four educated young men are now qualifying as wine experts.

Cheap Wine Licences.

At your Oudtshoorn Congress, two years ago, you passed the following resolution: "In the opinion of this Congress it is most desirable that, in the interests of the wine industry, upon which such a very large section of our community is dependent, cheap licences be granted for the sale of natural grown Colonial wines only." This resolution was, on the motion of Mr. Goulden, unanimously re-affirmed at last year's Congress. Nothing has as yet been done by Government in this direction, for though they did draft a Bill providing for cheap licences, it never saw the light of day. When you passed that resolution wine farmers were still in fairly flourishing circumstances; they had started co-operative societies and were looking for a large market for the superior products which they contemplated making. To-day the position is considerably altered, for in spite of successful efforts to improve the article produced, prices have receded tremendously. At last Congress I was able to tell you that brandy was £17 per leaguer, and wine high in proportion. To-day brandy is almost unsale-

able at £11, and thousands of leaguers of wine have had to be disposed of at £2 10s. per 127 gallons, that comes to less than three farthings per quart. I need hardly tell you that it is quite impossible to produce it at that price. We are told this is due to over-production. I estimate this year's production at 8,000,000 gallons of wine and 15,000 leaguers of brandy. British South Africa south of the Zambesi has a population of 6,336,756. France with a population about six times greater makes 250 times as much wine, and is able to dispose of it amongst her own people, for she imports twice as much wine as she exports. In spite of this large consumption, the French, as compared with most other nations, are a sober people. It appears that despite Phylloxera, a large population, and a modest output, our stocks of wine and brandy are rapidly increasing, and some of our merchants have publicly stated that they have three years' stock on hand, that is, they could, without purchasing a gallon of wine for the next three years, continue to carry on their business. We know that there are 6,779 leaguers of brandy on hand against which Government advances have been made. One of our largest brandy dealers estimates that this amount is likely to be increased by three thousand leaguers this season. So we are driven to the conclusion that there is more being produced than is likely to be consumed under present conditions. What is the reason for this state of affairs, for we are producing no more than we did 20 years ago, when our population was very much smaller than it is to-day? The reason is plain; we have from time to time placed more and more restrictions upon the sale of the product of the vine, until to-day, apart from the white population, which is mainly a whisky-drinking one, we are forced to pour most of what is sold down the throats of what are known as coloured men, instead of distributing it evenly and soberly amongst the whole population.

Mozambique and Transvaal.

The strangest part of the whole business is that while we are ruining some of the finest districts in the Western Province, carrying the largest country populations, owned by as fine a type of farmer as exists in any part of the world, our South African system encourages the importation of over two million gallons of wine, which comes from Portugal and is sold in Portuguese territory to natives, who have earned the half a million of money which they pay for it within our Customs Union. The Transvaal allows no liquor to be sold to natives within its borders, but it takes annually from Portuguese territory 56,000 natives; these do not remain in the Transvaal, where they can get no wine, but go over the Portuguese border and stay there until they want more money. They are then again recruited, through the W.N.L.A., costing the mines so much per head for recruiting. Could these men obtain a reasonable amount of drink in the Transvaal they would remain there, save the mines the continued expense of recruiting them, and make their labour supply more permanent. In order to have this privilege of recruiting in Portuguese territory the Transvaal has entered into an agreement with Portugal, called the *modus vivendi*. This agreement prevents us from competing on fair terms against the Delagoa railway, and as a consequence that line is carrying 53 per cent. of the total imported goods for the Transvaal, whilst we have dwindled down to 12 per cent. for our lines. Owing to our gradients we could compete favourably. The *modus vivendi* prevents us; the lines we built for the Transvaal traffic are losing heavily. At the root of the matter is the refusal of the Transvaal to allow the produce of the vine within the Union to be sold to the workmen within the same. Mind you, it does not prevent them from eventually procuring all the drink they want or spending their money on drink. It only delays them for a short time at the expense of the wine farmer of Cape Colony, who might have the benefit of that half million, and also at the expense of our railways, and thus the general taxpayer of the country.

Natives and Liquor.

Now, having said so much about the short-sighted policy of one of the parties to the Union, have we any right to ask them to put this matter straight? How ridiculous we would look if we went to them and they replied: How do you treat your own natives? If we want other parts of the Union to allow their natives to consume our wines we must first of all prove that we are capable of framing measures, that whilst allowing them to have the privileges of men, will prevent them from becoming beasts. I believe this can be done. In other wine-making countries the workmen drink wine, and can by no means be set down as a drunken people. Why not make our native workmen a sober, openly allowed, wine-drinking lot of men, instead of a smuggling, secret, native beer decoction-drinking lot of men. The authorities cannot and do not control the smuggled brandy and secret beer drinking. Open drinking at properly controlled houses where drink would be sold by the glass only to natives would mean less drunkenness. There would be no longer selling by the bottle, and a drunken man on the premises would then mean the loss of the licence. The experiment might well be tried, for its success would mean so much to a very large section of our community.

FRUIT GROWERS.

Whilst the wine farmers are in a bad way, the fruit growers have done better. They have had an abundant crop, and though throughout South Africa prices have been low, the export trade has been very satisfactory. Several of the largest exporters of fruit express themselves as being well satisfied with the returns from their shipments. Nevertheless, there is still something wrong in the distribution on the other side. We are told that so small a shipment as 8,000 boxes has glutted the market. We know that at times that same market absorbs daily from France 30,000 cases of Bonne Chretienne pears. In one of his reports, Mr. Chiappini tells us that the day after the arrival of the particular shipment which I have referred to he endeavoured to get some of the fruit for the Exhibition. None was to be had, yet the whole consignment had been forced on the market the day before at half the price that the previous week's shipment realised. The fruit had arrived in just as good condition; there was no objection as to quality, yet here was this tremendous drop: a truly discouraging state of affairs. Surely there must be some means whereby we could prevent these disastrous and ruinous fluctuations. We do not want fancy prices for our fruit, 6d. or 1s. per box, according to condition or quality of a good shipment, should be the difference There ought, however, to be some staple value, as in other perishable products. One does not find meat being sold at 6d. one week and 3d. the next; yet without proper distribution it might very well happen. A solution of the difficulty might be found in sending all our fruit to cold storage in London and Southampton, consigned to our commercial agent, who would distribute and supply orders, and in all probability would succeed in selling the consignment before arrival. It may well be found, when we get to the bottom of these serious fluctuations, that one or two firms on the other side have made a big thing out of Cape fruit at the expense of the industry. The appointment of a commercial agent was a step in the right direction, and one that you have urged for some time past. Mr. Chiappini is enthusiastic, able, and energetic, and he should be able to do a good deal towards finding markets and regulating the sale of our products. At the request of a deputation from the Board of Horticulture and Exporters' Association, an inspector was appointed to examine and brand fruit for export. I am sure you will agree that Mr. Bulmer's appointment to the position was a happy one, and though some may think he has been a little bit hard on their fruit, they will, I am sure, ultimately admit that it was for their own good. We commend the Government for their attempt to bring in the small grower as an exporter, and congratulate them on the success that the enterprise has met with. It is in that direction that we will ultimately find the biggest growth of the export trade. While making our acknowledgment to Government for their assistance in this matter, we would like to know why the small fruit traffic to Johannesburg and the Transvaal is being killed by the prohibitive railway charges; 7s. for a 35 lbs. box of fruit per passenger train and 5s. for the same by goods makes it quite impossible to send single boxes of fruit either to customers or friends.

EXPORT STATISTICS.

It is pleasing to note that a good deal is being done in the way of placing fruit in cold storage; to this is due the fact that in spite of an abundant apple crop prices have been fairly high. The following figures are interesting as showing the expansion of the fruit trade: Our oversea exports were in 1904 £8,427; in 1905 £9,203; in 1906 £14,476. Of this last amount £1,230 went to German South-west Africa. Tons: 1904, 462; 1906, 1,013; 1907, 1,385 to April of this year. You exported into the Union fresh fruit in 1904, £79,823; in 1905, £97,399; and in 1906, £105,852. You also exported of your own production to the other Colonies within the Union, dried fruit: 1904, £9,497; 1905, £11,315; 1906, £11,780. I was unable to obtain the amount of bottled or tinned fruits, jams, and jellies for 1904-05, the Statistical Department not having the figures, nor can I find any published record of them. In 1906, however, you exported to the Colonies within the Union bottled and tinned fruits £1,619, and jams and jellies £13,212. Oversea exports of dried fruits, jams, jellies, etc., £1,046. This makes a total export from the fruit industry of £147,975, a fairly gratifying return when we come to consider that the industry is still in its infancy. In order to see what room there is for expansion within the Union, let us see what their total imports of the products of the fruit industry are. The four Colonies, the Transvaal, O.R.C., Natal, and Rhodesia, imported £258,508 of fresh fruit, and £101,027 dried or preserved; total, £359,535. Natal exported into the Union £126,025. Of this amount we probably absorbed £30,000 in Cape Colony, leaving £96,025 to be consumed by the which leaves a market still to be filled within the Union of £115,535, without coming other Colonies. Adding that to the amount they took from us, a total of £244,000, nearer home, which we will now do, for we imported into Cape Colony from oversea fresh fruit £9,413, dried £31,093, bottled and tinned £14,959, jams and jellies £22,410, or a total of £77,775, which gives us, without reckoning upon more prosperous times, a market which could be expanded by £193,310. These are

instructive figures, and well worthy of our attention. It is pleasing to note that a determined effort is being made to introduce our pines into the English market, for the possibilities of growing pines in the Eastern Province seems to be almost illimitable. It would, however, be well if we gave some attention to the advice from the other side, and endeavoured to obtain new and more favoured varieties. The Government might help the industry by importing such plants from different parts of the world, and acclimatising them in experimental plots.

Tobacco Prospects.

Whilst being mainly fruit and vine growers, many of us have learnt what American farmers urge, that, on the whole, mixed farming is most successful. It is because we feel that it is advisable to have more than one string to our bow that we have taken a great interest in the experiments made by the Agricultural Department, under the supervision of Dr. Nobbs, in the growing of Turkish tobacco for cigarette making. As our friends in the East might also take up this industry with advantage to themselves, I make no apology for giving you a slight sketch of what has just been done in the Drakenstein and French Hoek Valleys.

A few years back an agriculturist from Smyrna started fruit growing at French Hoek. In opening an envelope from home some Turkish tobacco seed fell to the ground in his garden; it sprung up in due course and grew most luxuriously; he was delighted with the plants, and showed them to his neighbours, who merely shook their heads; they had tried growing tobacco before, but the quality was poor, and so did this turn out to be. Being a practical grower, he tried different methods. Left the rich garden soil for poorer ground, he set aside irrigation; the result was a smaller leaf, but better quality. Cape Town manufacturers of cigarettes reported favourably on his tobacco, and were ready to take any quantity.

The Government getting hold of this report, saw that there was something in it. They immediately imported Turkish seed, distributed it free amongst the farmers, and appointed this gentleman (Mr. Stella) to teach them how to grow and cure this Turkish tobacco. Eight or ten farmers took it up, and the result to-day is, that in spite of all the difficulties of a new venture, some forty bales of a very fair cigarette tobacco is to be sold in Cape Town by public auction some time next month. Experiments are also being carried out in other parts, and are proving beyond a doubt that tobacco of first-class quality can be grown as successfully in the Cape Colony as in any other part of the world. Provided the labour is forthcoming, I have very little doubt that in the near future tobacco will be one of our chief agricultural exports. Should that prove to be correct, it will mean a large increase of population, as a family can live on a very few acres under tobacco; moreover, there is no large capital expenditure required, as in other farming, for stock and plant.

One word to the manufacturers, I trust they will not pursue the short-sighted policy of strangling the industry by forcing the farmer to sell his product at a price less than even the duty on the imported article. We, of course, know that tobacco is valued according to grade, but in any case if it can be used at all as cigarette tobacco it should at least be worth more than the duty, which is two shillings per pound on uncut tobacco.

I trust every farmer will make just a small experiment in tobacco growing. Some may only succeed in growing ordinary tobacco. Others may find their farms suited for the more valuable varieties. I believe there is a profit in any kind—in short, that there is money in the business, and for that reason commend it to your notice.

Agricultural Organisation.

After the close of our last Congress I was invited by the Director of Agriculture to take part, together with Messrs. Malleson and Hards, who were then in Cape Town representing Agricultural Societies, in a Conference of members of The Agricultural Union, Central Farmers' Association, and Fruit Growers' Association. At this informal meeting the following resolutions were passed by a majority vote:

"That the Congress of each organisation nominate six delegates, who shall form an Agricultural Council to meet after the Congress to present the combined report to Government, and if any matter common to all arise, the same to be considered and decided upon."

"That the Fruit Growers' Congress deal with matters appertaining to Horticulture and Viticulture."

"That the Agricultural Union deal with Agricultural Shows and all matters relating to shows."

"That the Central Association deal with all matters relating to farming industries, except such spheres of labour as are allotted to the other Congresses."

Mr. Lee, as representing the Union, dissented from the sphere of work allotted to the Union Congress, and protested against the resolution. Later on the Union wrote expressing dissatisfaction, and so, of course, the whole matter fell to the ground.

Subsequently the Board of Horticulture instructed me to formulate a scheme by means of which it might be possible for us to act together for the common good.

This scheme has already been discussed by the Central Farmers' Congress, who have not taken any adverse resolution upon it, but have postponed discussion until their Congress next year, which is to be held at Kimberley. The subject is on your agenda paper, and I trust we will be able to see our way clear to hold our next Congress in the same town on the same date, as it might then become possible for us to meet each other and mayhap come to some understanding. Should the Agricultural Union also decide to hold their Congress at the same time and in the same town, I feel convinced that some common basis of action will be found. At the same time, I am convinced that no scheme which in any way attempts to absorb one of the bodies into another or takes away any of its present privileges will have the slightest chance of success.

Government has published a pamphlet giving full information on the working of the Agricultural credit system as carried out with such success in the different Australian Colonies, and they are, I believe, prepared, should the Agricultural community so desire, to bring in a Bill next session introducing a similar or modified system into this Colony. I therefore trust there will be a full discussion on this subject, and that a well-considered resolution will be arrived at.

Last year Parliament voted £2,000 towards a South African Products Exhibition in London as an advertisement for our products, more especially fruit. It has proved a great success, and we are hopeful that it may result in an increased demand for such products as we are in a position to supply, and as regards others of which we were only able to furnish samples, it may be the means of bringing capital and energy into this country for their exploitation.

In conclusion, I congratulate you on the fact that so many of the resolutions passed at your last Congress have been favourably received and acted upon by the Ministry. Your success has been due to two reasons, first to the fact that you have carefully discussed and well weighed your resolutions before adopting them, and, secondly, because you have a sympathetic Government, one that has ever had an open ear to the requirements of the farming community.

I welcome you all to this Congress, may your deliberations tend to the welfare of your industry, and may the success you have met with in the past be even greater in the future.

Congress then adjourned so as to admit of the Boards transacting local business.

The delegates were entertained to luncheon at Meine's Hotel by the Town Council.

On resumption at 2.30 p.m.

Government Grants.

Mr. Hobson (King William's Town) moved that horticultural exhibits should be placed on the same footing as agricultural exhibits in regard to Government grants. Mr. Ginsberg seconded.

After the Chairman had explained the difference between the treatment meted out by Government to agricultural shows as against horticultural shows, a discussion ensued, in which many of the members took part. The motion, on being put to the meeting, was declared negatived, only seven votes being recorded in its favour.

Fruit Stocks.

Mr. Hards moved: That Government be requested to appoint a Commission to inquire into the best stocks for fruit trees, and also the correct naming of fruits, and that the President and one Vice-President of each of the Boards be added to any Commission which might be appointed. Mr. Ginsberg seconded.

Mr. Tribolet spoke of the scope of the Commission and the difficulties which faced them in the subject.

Mr. Goulden favoured the appointment of a Commission.

Mr. Hards, in reply, deprecated entering into details as to how the Commission should be worked. It was simply a matter of agreeing to a principle.

A vote being taken, the original motion as amended, was agreed to by 11 votes to 10.

CODLIN MOTH.

Mr. Ginsberg moved: That this Congress is of opinion that all fruit subject to codlin moth consigned to points without those areas defined as infected areas, should be inspected, and any consignment showing a percentage of diseased fruit over and above a limit laid down in the regulation be destroyed.

Mr. Hards seconded, and spoke at considerable length on the question of the consignment of fruit from unclean areas to those in which the disease was not known to exist.

Mr. Landrey raised the question of the appointment of inspectors of fruit under the Act 15 of 1894.

Mr. Micklem moved that the limit be 3 per cent., and any consignment containing more than that percentage of diseased fruit should either be refused or destroyed.

Mr. Goulden moved that the motion be expunged from the agenda.

Mr. Stephens seconded.

The amendment was agreed to, and the original motion negatived.

General Sir E. Y. Brabant moved, and Mr. Hards seconded: That this Congress recognises and appreciates the efforts now being made, although long delayed, by Government in protecting the clean areas against the introduction of the codlin moth, and again impresses on Government the necessity of the most stringent enforcement of the regulations.

This was agreed to *nem. con.*

It was moved further: That Congress discuss the best means of combating the spread of codlin moth with a view to introducing a permissive Bill into Parliament.

Mr. R. J. Bulmer gave an interesting account of the fight which had been and was being waged against the pest in the Western Province. His advice was: "Don't depend on legislation, but go right away as if you had codlin moth. He advised all orchard owners to spray all trees liable to the disease, and pointed out the various times at which it was advisable to use different chemicals."

Mr. Goulden did not see the force of Mr. Bulmer's remarks, and quoted from Mr. Lounsbury's pamphlet on the subject.

Mr. Bulmer replied to Mr. Goulden's remarks and spoke against the introduction of a permissive Act.

Mr. Slemment (Gonubie) moved: To ask what is the most effective method of fighting the codlin moth.

Mr. Lingwood seconded.

Mr. Barry brought to the notice of the Congress that fruit infected with codlin moth was to be seen on the King William's Town market, in fact, he had that morning seen boxes of diseased fruit.

Mr. Goulden explained that the apples were not from the Western Province. They were packed in boxes branded J. Serimbock, Paarl, but contained apples from Mr. Preston, of Waku, who had bought the boxes new in the Western Province.

Mr. Micklem said it was not the intention of Western Province farmers to send infected fruit into clean areas in the Eastern Province.

Mr. Leighton (Aliwal North) detailed the efforts which had been made in Aliwal North to keep down the disease.

The Gonubie Association moved: To urge the enforcement of the restrictions against the introduction of codlin moth into the Eastern Districts.

This was agreed to.

Mr. Micklem moved, and it was carried unanimously, that Government be asked to approach the Transvaal Government to urge them to revise the regulations with regard to codlin moth by allowing sorting and destruction only of fruit which was found to be infected.

Mr. Hutchins.

Mr. Goulden moved that this Congress expresses its regret at the departure from the Colony of Mr. Hutchins, of the Forest Department. It was always a good thing that a Congress such as this should make expression of its appreciation of departmental servants.

Mr. Dugmore seconded, and the motion was unanimously agreed to.

Mycologist.

Mr. Ella moved, Mr. Lingwood seconded, and it was agreed to, that seeing that the appointment of a mycologist is now a matter of urgency, that Congress re-affirms the resolution passed at the Oudtshoorn Congress, 1905.

Mr. Persse moved and Mr. Buller seconded, that an endeavour should be made to secure the services of Mr. Pole Evans to act as mycologist for the Colony as well as for the Transvaal. The mover explained that the suggestion was one based on economy.

Mr. Micklem expressed the sentiment that half a loaf was better than no bread, and the Government of the Transvaal would give Mr. Evans's services free, on payment of that gentleman's expenses to the Colony. He had authority for making such a statement.

Mr. Goulden read extracts from the report of the Director of Agriculture regarding the excellent work done by Mr. Pole Evans in this regard.

Mr. Dewar (entomologist) gave a lengthy account of Mr. Evans's work in connection with mycology.

Hon. C. W. H. Kohler having urged the resolution on the meeting,

A vote was taken, and the motion declared carried with only one dissentient.

Botanist and Ornithologist.

Mr. Leighton (Aliwal North) moved, Mr. Goulden seconded, and it was agreed to, that Government at the earliest opportunity consider the appointment of (1) a Colonial botanist, and (2) a Colonial ornithologist.

Fruit Expert Wanted.

General Sir E. Y. Brabant proposed that in the opinion of Congress the time has now arrived when the appointment of a fruit expert for the Eastern Province is a matter of urgent necessity. The visits of Mr. Pillans were few and far between, like angels, but showed the necessity for the appointment of a permanent man who could advise on the subject of fruit packing, which would enable fruit growers to become exporters.

Mr. Kruuse seconded, and in doing so enlarged on the necessity of an expert for the Eastern Province.

Mr. Dugmore (Bathurst) deprecated the expert from the Western Province, and spoke strongly in favour of the motion.

The motion was agreed to.

Experiment Station.

General Sir E. Y. Brabant moved that an experiment station should be established in the Eastern Province. The necessity for an experiment station for the acclimatisation of foreign fruits was pointed out by the mover.

Mr. Lingwood seconded, and the motion was heartily supported by Hon. C. W. H. Kohler, who gave a description of the experiment station at Robertson, and promised his support in the House.

Mr. Dugmore pointed out that the request had been made repeatedly for the past ten years.

Mr. Hards thought they should add an Agricultural College, and he moved an amendment accordingly.

Mr. Stegmann seconded.

The amendment was negatived, and the original motion carried.

Mr. Kohler's Scheme.

By permission, Mr. Kohler moved, and Mr. Hards seconded, that this Congress endorse the scheme formulated by the Hon. C. W. H. Kohler, as published in the January number of the *Agricultural Journal*, and that to this end the next meeting of Congress be held at Kimberley on the same date as the Central Farmers' Association.

Mr. Kohler explained that his scheme was to prevent overlapping in matters which were discussed by the Horticultural Boards, the Agricultural Union and the Central Farmers' Association, by the holding of Congress at the same time and place as the Central Association. The resolutions would be sent as at present, and discussed, and the matters to be discussed agreed upon. With a view to preventing overlapping between the various organisations he moved that a carefully worded telegram be sent to the Agricultural Union that as the Central Association have decided to meet in Kimberley it was hoped the Agricultural Union would see its way to do the same. At that meeting some scheme might be found, not necessarily the one he had outlined, but one which would have the same effect, and by co-operation beneficially affect themselves and the Cape Colony.

Sir E. Y. Brabant deprecated any idea of amalgamation with the Agricultural Union.

Mr. Lingwood pointed out that amalgamation was one thing which they had to look forward to.

Mr. Persse rose to a point of order, that the first part of the resolution had been dropped, and the question was where to hold next Congress.

Discussion on the first portion of the resolution was deferred.

Next Congress.

Mr. Dugmore moved that next Congress be held at Kimberley at the same time as that of the Farmers' Association.

Mr. Hards seconded.

Mr. Kruuse pointed out the difficulty in getting delegates to go.

The resolution was declared carried, and the Secretary instructed to despatch a wire intimating the decision.

Locusts.

Mr. Lingwood moved: (a) That this Congress urges upon Government the necessity of an Act being introduced at an early date whereby landowners and occupiers will be compelled to destroy locusts in the voetganger

stage found on their property; (b) that Government be asked to keep the various methods of dealing with the locust pest other than the spraying with arsenite of soda now in vogue, before the eyes of farmers and others concerned.

Sir E. Y. Brabant seconded, and it was agreed to without discussion.

Mr. Kruuse moved: That at the forthcoming Conference to be held in Pretoria between representatives of the five colonies, Portuguese East Africa and German West Africa, to consider the question of the extermination of locusts, Government be asked to select men of experience in dealing with the matter, their evidence to be taken as if before a Commission, and that Mr. W. Goulden be asked to represent this Congress at that Conference.

Mr. Lingwood seconded.

Mr. Dewar explained the constitution of the Conference to be held at Pretoria, and after a desultory conversation further discussion was deferred.

Congress then adjourned till 9 a.m. on Thursday.

Congress resumed at 9 a.m. on Thursday, May 16, most of the delegates being present.

The minutes of the previous day's sitting were read and, after some minor alterations, adopted.

Locusts.

The deferred discussion on the question of locust extermination was resumed.

Mr. Kruuse, the mover, read extracts showing that the destruction of locusts in the O.R.C. had cost £5,000, which worked out at 1d for every five pounds.

Mr. Goulden read extracts from the Johannesburg *Star* as to the composition of the Conference.

The question of the legality of Congress's action in appointing a delegate formed the subject of a desultory discussion, and on a vote being taken the motion was agreed to, Mr. W. Goulden being asked to look after the interests of Congress.

Mr. Leighton (Aliwal North) moved: That Congress discuss the best steps to be taken for the destruction of locust eggs and voetgangers that will hatch out during the next season in the North Eastern and other districts of the Colony.

Mr. Venables seconded.

Mr. Ginsberg described what had been done with reference to local Locust Board, of which he was one of the members. At present these were simply a farce and of no use.

It was decided to leave the matter over as the subject was coming before the Pretoria Conference.

Mr. Kruuse gave his experience of the efforts of Mr. Malley in the destruction of voetgangers in East London district.

Colonial Industry.

Mr. Hards moved: That in the interest of fruit growers, to enable them to dispose of their surplus fruit, to place the manufacturers in a position to purchase this fruit, and to put them on an equal footing with their competitors in the Orange River Colony, the Government's attention be drawn to the necessity of granting some relief to the manufacturers either

by offering a bonus of one penny per pound on all jams and preserved fruits manufactured in the Colony from fruit grown in the Colony, with an extra penny per pound on all such manufactures exported from the Colony, or by granting a rebate of the full duty on all materials used in the manufacture of jams and preserved fruits grown in this Colony, provided such materials are not produced in the Colony in sufficient quantities to meet manufacturers' requirements.

Mr. Dugmore seconded.

In formally moving this, Mr. Hards said: The object in bringing this matter before Congress is to impress upon Government the necessity of giving the jam manufacturer and fruit preserver a fairer opportunity of competing not only with the oversea importations, but with the O.R.C. At the present time the duty is 2½d. per lb., which is as much protection as manufacturers ask, but this under the Customs Convention does not prevent the O.R.C., who are working under a bonus of 1d. per lb., sending their manufactures into this Colony, and they are doing this at the present time to the detriment of the Colonial manufacturer. You will all be aware that at the last Customs Conference an extra duty of ½d. was imposed, but the preferential railway rate was abolished and a duty of 15 per cent. was put upon boxes, so that the ½d. was not of any assistance, and the manufacturers did not ask for it. What they did want was for all materials used in the manufacture of jams, etc., not produced in the Colony, to come in duty free or a rebate of the duty, which would practically come to the same thing. Before the Customs Convention came into force, ordinary assorted jams were selling wholesale at 4s. 3d. to 4s. 6d. They are now selling at 3s. 6d. Now, gentlemen, those who do not know the cost of the different materials used in the manufacture of jams and preserved fruits, will know the price they obtain for their fruit, and when they add the price of sugar, tins and bottles, cases, labels, etc., they will find that instead of a profit the margin will be on the wrong side. I have dwelt rather long on the manufacturers' side, but only with the object of making their case clear, and to show that it is not altogether their fault that they did not take all the soft fruit that growers had to offer last season. It is not to be expected—and if some think otherwise, I can assure you that manufacturers are not running their factories to buy fruit to look at. To put it in a nutshell, there would have been little fruit wasted this last season, or, for the matter of that, any future season, if there was any likelihood of a profit to the manufacturer. I have ascertained that the different manufacturers in the Colony handled about 1,200 tons of stone fruit, but this is nothing like what they could buy if conditions were more favourable. I estimate that the existing factories, given fair treatment to enable them to show a profit, could take 2,500 tons of stone fruit. Consider what this means to the fruit grower and his bank balance. It means, in my opinion, the difference between a profit and a loss or a bare paying of expenses to any large grower.

We imported for consumption in the Colony last year jams from the United Kingdom, 925,974 lbs., representing £21,566; from Australia, 483,336 lbs.; from Canada, 428 lbs.; from America, 4,553 lbs.; from other countries, 3,785 lbs.; total, 1,418,096 lbs. Of preserved fruits we imported from the United Kingdom, 214,081 lbs.; from Australia, 183,742 lbs.; Canada, 8,266 lbs.; America, 341,850 lbs.; other countries, 115,439 lbs.; total, 863,378 lbs.; or a grand total of 2,381,474 lbs. It must be obvious to you all that unless the fruit growers go hand in hand with the manufacturers the importations such as quoted above stopped, and one and all of the consumers insisting upon having Colonial manufactures on their tables, there is a bad look out for the grower, manufacturer and the

country generally. One could go into the question very much further, embracing many other arguments in favour of the resolution I am about to submit to you, but time will not allow on this occasion. I hope the members present will discuss this matter fully, and if nothing further comes of it, my object will in a measure be attained.

Mr. Bulmer deprecated the giving of bonuses, as tending to increasing the production in jams with a corresponding decrease in the quality of the article produced.

Mr. Ginsberg said that at the last session of Parliament he put the question to the Government whether it was a fact that the O.R.C. was granting a bonus on jams, sweets, and leather to manufacturers in that country, and if so, was the Government of this country prepared to grant similar bonuses to the manufacturers here. This question was replied to by Dr. Jameson himself, who said it was a fact that a bonus was granted by the O.R.C. to these manufacturers. It was granted, he understood, illegally, and he was of opinion that there was nothing in the Customs Convention which empowered the O.R.C. to grant these bonuses. The fact remained, however, that it had been done, and it was certainly greatly detrimental to the manufacturers in this Colony. He understood that not only was the bonus applied to jams consumed in the O.R.C., but also to jams which were produced under the bonus system and exported to the Cape Colony. He moved an amendment that Government be asked to object to the granting of bonuses on jams on the part of the O.R.C., or failing this, to grant an equivalent bonus to the manufacturers in the Cape Colony. In the first place they should try to do away with bonuses. He understood that a protection of 2d. per lb. would be adequate as far as Colonial manufacturers were concerned. Imported jams were costing quite 6d. per lb., or 7d. laid down here. Why was it, in spite of that tremendous difference, that Colonial jams were not absolutely sweeping the market? His opinion was that the fault was not so much the manufacturers as that of the public, who refused to buy Colonial articles, and the manufacturers themselves were great culprits. He believed that at the present time they had sufficient protection if the prejudice of the people to the Colonial produced article could be overcome. He asked for cordial support to his amendment, with a view to a solution of the question.

Mr. W. T. Leighton seconded.

On the vote being taken the motion was negatived and the amendment carried.

Protection.

Mr. Ginsberg moved that this Congress declared itself in favour of protection of Colonial industries. This sentiment, he said, was perfectly right from a Congress like this. The Manufacturers Association, when holding a Congress about 18 months ago in connection with the Customs Convention, had passed a similar resolution in connection with the farming industries for the protection of the works and products of the soil, and it was then carried unanimously, showing that they were sympathetic so far as that industry was concerned. He considered that they as a Congress should declare themselves in favour of protection of Colonial manufactures. Some of the members of this Congress were manufacturers themselves, but he personally was not in favour of a high protection, because it did not act beneficially, as far as the quality of the articles were concerned, but it was necessary that the manufacturers should try to do their own duty when it was quite possible to do away with the existing prejudice.

Mr. Goulden seconded.

Major-General Brabant considered that the motion was entirely out of the question, and it was not a matter which should be discussed at a Congress like the present.

Mr. Micklem did not think the Congress was in a position to discuss the question of protection.

Hon. Kohler also spoke in support.

The motion was put, and declared carried by 21 votes to 7.

Vegetables.

Mr. Hards moved that the attention of Government be drawn to the quantity of preserved vegetables imported into the Colony, and to encourage the industry of vegetable growing by placing an increased duty on imported vegetables.

This was agreed to.

Insurance.

Mr. W. T. Leighton moved: That Government be requested to approach the different insurance companies with a view to them taking up insurance of fruit and other crops, against the ravages of hail, at lowest rates.

After a short discussion the motion was agreed to.

Vine Disease.

Discussion took place on the question of the recent outbreak of vine mildew (Plasmopara viticola) in the Eastern Province.

Mr. Goulden regretted the Eastern Board had not been officially notified; however, Mr. Hards had attended the inquiry on behalf of the Board.

Mr. Micklem reported what was done by the Western Province delegates who visited Grahamstown.

Mr. Leighton said that at a Congress held at Cathcart it was reported that there was a disease in imported vines at Fort Cunningham, but the officials at the meeting would not admit the fact. Some 18 years ago a large number of cuttings were imported for the Western Province, but they were unwilling to take the risk, and the cuttings were planted in vacant land belonging to the Railway Department at East London, from where cuttings were distributed to a great many railway officials, and were planted all over the country.

Mr. Dugmore said, Mr. Gowie of Grahamstown had known the disease for 14 years.

Mr. Leighton said Mr. Lockie, the Curator of the Botanical Gardens, King William's Town, who was at one time assistant curator at the Grahamstown Gardens, was prepared to swear on oath that the disease was in Grahamstown 13 years ago.

Mr. Laubscher mentioned that Graaff-Reinet suffered considerably owing to the hasty promulgated Regulations.

Mr. Kohler's Scheme.

It was agreed to endorse the scheme formulated by Hon. C. Kohler, as published in the *Agricultural Journal*.

Prizes.

Mr. Bulmer moved: That Agricultural Societies should be asked to give prizes for commercial quantities of dried and preserved fruits.

This was agreed to.

SHOWS.

A discussion took place as to the large number of Agricultural shows now being held, but no resolution was forthcoming.

RAILWAY PASSES.

It was agreed to endorse the principle adopted in Australia, and that delegates to all agricultural congresses should be supplied with free railway passes by the State.

CREDIT SYSTEM.

An interesting discussion took place on the subject of agricultural credit, and it was agreed that this Congress endorses the principle of the credit system to agriculturists.

Mr. Micklem moved: That the Government be approached in order to obtain a removal of the import duty on fruit box material.

Mr. Hards seconded.

Mr. Ginsberg made a strong appeal for adherence to principle, and the principle of protection should be applied to every thing.

Mr. Ella gave an undertaking that, in conjunction with the Forest Department, he would send samples of fruit boxes to the Western Province fruit growers, as an experiment of what could be done within the Colony.

The motion was agreed to

Congress adjourned till 2 p m

Congress resumed at 2 p.m.

EXPORT FRUIT.

Mr. Buller moved: That the Government inspection of export fruit should be made compulsory, and that the Inspector should have power to reject all unsound fruit found. He pointed out that no power was at present vested in the Inspector to reject certain varieties, and he directed attention to the fact that pears of a stewing class were taken out of boxes at Covent Garden and exposed for sale as Cape pears simply. He had been one of the Inspectors of export fruit, and he commended the motion to the Congress.

Mr. Bulmer seconded, and in reply to Mr. Ginsberg, gave a very interesting *resume* of the export trade from California.

Mr. Joubert favoured compulsory inspection of fruit so as to keep up the good name of Cape fruits in the over-sea markets.

Mr. Hards was of opinion that the resolution should touch only on unsound fruit, and not have reference to the prohibition of the shipping of certain varieties.

This suggestion having been agreed to by the mover, the motion was put and carried.

UNFORTIFIED WINES.

Mr. Lange moved that this Congress views with concern the continued grave outlook for the wine farmers, and respectfully suggests to the Government that they approach the mine owners of the Cape Colony and the Transvaal with a view to securing the use of unfortified Cape wines in their mines under supervision.

Mr. Goulden moved as an amendment: That this Congress views with concern the continued grave outlook for the wine farmer and considers it most necessary that a complete understanding be come to with the other South African Colonies in regard to the supplying of light unfortified wines to the natives; with this end in view, this Congress respectfully suggests to the Government the advisability of convening a Council composed of members from all South African British Colonies to consider the matter, and if possible, to arrive at a definite policy.

Mr. Buller seconded.

The Hon. C. W. H. Kohler pointed out the position of the wine industry and the position which faced that particular portion of the Cape Colony engaged in the trade. He pointed out that the accumulation of wine in the country was not the result of over production, but was due to the restriction on the sale of the Colony's product, which should naturally be for the people of the Colonies.

Mr. Landrey appealed to the meeting to affirm the resolutions passed at the Oudtshoorn Congress and re-affirmed at Cape Town.

Mr. Dugmore said he had been thanked by natives themselves for prohibition.

Mr. Venables said they were dependent on the natives, who were a valuable asset, and liquor had a most demoralising effect on them. He was very much in opposition to the motion.

Mr. Bulmer pointed out the consumption in King William's Town division, the amount consumed being practically the same under the restrictions as when the trade was open.

The amendment was carried.

Compulsory Spraying.

Mr. Joubert moved that Government be urgently requested to bring in a Bill during the coming session of Parliament making compulsory the efficient spraying of orchard plants and trees infected with insect pests and fungoid diseases.

Mr. W. T. Leighton seconded.

Mr. Bulmer explained the action of the Compulsory Spraying Act in California.

The motion was agreed *nem. con.*

Oversea Nursery Produce.

Mr. Grace moved that Congress approach Government with the object of restricting the dumping of oversea nursery produce at as early a date as possible.

Mr. W. H. Leighton seconded, and in doing so pointed out that the Nurseries Act covered the ground.

Mr. Grace said he knew of one man who purchased raspberries and currants which were prohibited.

The motion was agreed to.

Botanic Gardens.

Mr. Grace moved: That public Botanic Gardens receiving Government grant or public funds should not be permitted to sell nursery produce, seeds or such like, to the detriment of private enterprise.

Mr. Lingwood seconded.

The Hon. C. W. H. Kohler thought the resolution was going somewhat too far.

The motion was lost.

Cheap Licences.

Mr. Micklem moved that the resolution passed at Cape Town Congress regarding cheap licences be affirmed.

Mr. Barry seconded, and it was agreed.

Agricultural Union.

An invitation from the Agricultural Union of the Cape Colony to attend the sitting of the Inter-Colonial Union was read.

Hon. Mr. Kohler moved that a reply be sent stating that the Congress would be pleased to be represented if the invitation had come direct from the Inter-Colonial Union.

Mr. Hards moved acceptance of the invitation.

Mr. Lingwood seconded.

The amendment was lost, and the original motion declared carried.

Votes of Thanks.

The Hon. Kohler moved a vote of thanks to the Mayor and Council and the other public bodies of King William's Town who had so generously and so well entertained the delegates. He also desired to thank the local club and all others who had shown them kindness in King William's Town. The visitors were all aware that they had been very well treated in King William's Town, in fact nothing more could have been done for them, and they would go back with pleasant recollections of their visit to Kaffraria.

The motion was carried with acclamation.

A vote of thanks was passed to the Chairman (Mr. Leighton), the Secretaries (Messrs. Persse and Goulden), and the press for their services, after which the minutes of the concluding session were confirmed and the business concluded.

REPORT ON VINEYARDS INSPECTION.

WORCESTER DISTRICT.

The following report by the Commission on American vines is published for general information:—

We have the honour to report that in company as commissioned we visited a number of wine farms at Nuy, Goudini Road, Slang Hoek, and Rawsonville, in the Worcester District, for the purpose of observing and reporting on vines grafted on American resistant stocks of different varieties.

No one district can be said to consist of a uniform class of soil, or even of soils having the same characteristics; indeed, on most farms we found soils varying in texture, composition and position to such a degree that stocks admirably adapted to one portion of the farm were quite unsuited for some other portions. This patchiness and difference of soils, both of texture and disposition that presents itself over small areas, is one of the most serious difficulties in the selection of stocks that the vine grower has to contend with, and entails not only the study and close observation of the affinity of certain stocks for the scion, but also the adaptability of stocks to local conditions. Hence, on one farm, or even part of a farm where one variety of vine thrives on a particular stock, on another farm, or even on part of the same farm, that vine on the same stock may not be a success. Thus the number of mistakes made, and also the necessity of close observation of the success or non-success of the vines that have already been planted on these different soils under differing local conditions of practically the same soil. In a report such as this, we do not think it necessary to note every slight variation, or to go into the statistics of each particular vineyard, but simply to deal with the most salient and important features that presented themselves to us on our rounds of inspection.

The first vineyard visited in this district was that of Mr. P. D. D. Hugo, "Glen Oak," Nuy, and special mention may be made of the 15,000 Green Grape on Metallica × Rup. planted in sandy soil, and about the same number of Muscadel on the same stock planted in 1905 in a fairly stiff, well drained, bluey soil, said to contain a good percentage of lime. This is one of the finest pieces of vineyard to be seen in the district.

In a patch of about 7,000 Pontac, planted twenty days after the old phylloxerated vineyard was taken out, on Jacquez—Aramon × Rup. and Metallica × Rup., obtained from the Government Nursery at Tokai, there are a number of misses which may be accounted for by the vines being planted with the union high out of the ground, and the plant not having been hilled up to prevent it drying out.

The vines on the different stocks are doing equally well, except some on the Metallica, which happen to be planted in brak spots.

Near by we come to a block of White French on Metallica, three years old, looking well.

The next portion of the vineyard is of great interest, as it is planted with 50 different varieties of wine and table grapes all on Metallica, in slightly brak ground drained to a depth of four feet. This, as an experiment of the affinity of different scions to one stock, should be kept under observation from year to year.

So far, the vines seem to be doing uniformly well.

There is also a plot of some extent planted with most of the American stocks in the Colony, of which Rip. × Rup., 3306, seems to be doing best.

On the whole the vineyard is admirably kept, and a considerable amount of work is being done in the matter of draining the lower lying portions of the vineyard.

Mr. P. P. Rabie's vineyard, "Onder Kloppers Bosch," which consists of about 100,000 vines, was next visited. Here we find Muscadel on Aramon, two years old, looking well and carrying a fair crop of grapes. Another lot adjoining, but on Metallica, practically no difference. Also some on Jacquez beside those on Aramon not looking quite so well as the ones on the latter stock.

A big area of old ungrafted Cabernet show very strong growth, but carrying rather light crop. This vine under ordinary short pruning bears light crops, which may be greatly increased by a system of rod pruning.

Young Green Grape on Aramon doing fairly well where they have struck, but show a large percentage of misses, due mainly to not being earthed up when planted. Some Green Grape on Metallica doing better than those on Aramon.

White French, private grafting, doing very well on Metallica. The same on Aramon, from Tokai, not doing so well as those on Metallica

Muscadel on Aramon fairly good, but a number of misses due to cause previously mentioned—not earthed up when planted.

The next farm touched at was Mr. De Vos Rabie's, "Brak Vlei." Pontac on Metallica in sandy, slightly brak soil, with water level about five feet, not doing too well. Young Mataro on Metallica doing fairly well in rather moist soil

Othello, self-bearer, in brak not doing well. Sultana, one year, on Metallica, in low-lying, fairly damp soil, doing but middling. Same, two years old, fairly good.

On Mr. C. P. Naude's farm, "Old Wagon Drift," hard Karoo soil, containing fair percentage of lime, we find Hanepoot on Jacquez, four years old, showing fair growth and carrying good clean crop. Black Prince on Metallica in good condition Sufficient care is not taken to keep the vines upright. Hence a number are lying on the ground.

Goudini, Road, Worcester.

In this area we first visited Mr. P. P. Van der Merwe's farm "Groot Vlakte," and found Hanepoot on Jacquez, one and two years old, on deep soft broken soil, doing well, and two rows on Riparia Gloire also doing well.

Green Grape, four and five years old, on mixed stocks, doing remarkably well, and carrying good crop.

Green Grape on Old Rupestris, eight and ten years old, very uneven, showing signs of decay in places where the soil is low lying and of a stiff nature, very similar to the soil on which failures on this stock were noted last year in the Dal Josaphat, near Paarl. A plantation of Jacquez in fresh deep soil showed great growth. This vineyard is manured.

We next came to Mr. Jacobus Botha's "Groote Vlakte," where we saw three year old Hanepoot on Jacquez looking very well, except that it was slightly attacked by Erinose. Another lot of Hanepoot on Riparia Gloire, not quite so good as that on Jacquez either in the growth or the crop it was bearing. The vines were also lying over a lot. Green Grape on Aramon making good growth. All these grafted vines were planted the same season in which the old vines were uprooted. A nursery of 30,000 vines, Hanepoot on Jacquez, and wine grapes on Aramon, looking

splendid. The vineyard is planted on low-lying, well-drained, deep, sandy soil, unirrigated.

Mr. J. Marais' "Fark Blau-Fontein" was next visited, where Hanepoot on Jacquez, three years old, in deep alluvial soil, was found to be doing very well. Green Grape on mixed American stocks, three years old, good.

Green Grape on Aramon, fourth year, good; crop looking very fine grafted "in situ."

Green Grape on Metallica, five years old, planted in slight hollow, not well drained, water level only about 2½ feet from the surface. Not nearly as good as those on Aramon. Hermitage on Riparia at lowest spot doing far better than the same variety on Metallica in similar soil and under like conditions.

In a patch of Green Grape on the highest part of the land, with fairly good drainage, we find two rows on Riparia between rows on Aramon and Metallica. Those on Aramon best; Metallica next best; Riparia worst. Three year old Hermitage on Aramon, good. The vineyard is planted mostly on black sandy soil, unirrigated and lightly manured.

At Mr. D. Roussouw's "Slang Hoek," on light alluvial soil, we see Green Grape on Metallica, four years old, bearing good crop. Several kinds of Rupestris in this plot. The Rupestris Metallica propagated at Constantia does much better than any of the others.

Hanepoot on Riparia good, but vines lying over very much. Old Hanepoot on Jacquez crop satisfactory, and berries larger than those on Riparia. Mr. Roussouw prefers Hanepoot on Riparia because it ripens earlier, and his is a late farm.

On Mr. G. C. Roussouw's farm "Icabosch," Hanepoot on Riparia, four years old, in wet, low-lying, fairly stiff soil, with water level only about 12 inches from the surface, very bad with erinose, otherwise growing fairly well. Hanepoot slightly better on Jacquez than on Riparia. Mr. Roussouw considers Jacquez best stock for his soil, and his choice is confirmed when we see a block of Hanepoot on Riparia and one on Jacquez growing side by side. Those on Jacquez, although a year younger, are better than those on Riparia.

In a block of Green Grape, part on Riparia and part on Aramon, those on Aramon show up much the better. On account of the water contents of the soil being so great, we do not consider this site, except with deep drainage, particularly well adapted for vines.

On Mr. J. Everson's farm "Klip Heuvel," we have Hermitage on Aramon, three years old, in light vlei soil, looking very well; water level about three feet. Hanepoot on Riparia in same soil, medium. Hanepoot on Jacquez in pot clay very bad with erinose, making rather indifferent growth. Bailey on Aramon in fairly stiff vlei soil, very wet in winter and dry and hard in summer, much like the soil of the Dal Josaphat, doing well.

At Mr. P. P. Deitlig's farm "Klip Drift," Hanepoot on Jacquez, two years old, in rich damp sand, with high water level, fairly good. Green Grape on Aramon, two years old, on similar soil, looking poorly, and in places seems to be at a standstill. Want of deeper drainage the probable cause. Green Grape on Metallica, three years old, on left of road, looking fairly well. Average depth of water level on left of road about three feet.

The owner prefers Aramon to any other stock he has had experience with for the damper parts of his farm; considers Jacquez the best all-round stock, Aramon coming next. Mr. Deitliz says that Green Grape bears well on Aramon, but takes a year longer to come into bearing than when on other stocks. Where old vineyards have been taken out and

young vines planted immediately, they are not doing so well as where vines had not previously been planted. Nearly all vines planted in wet spots show discoloration of the leaves. Land said to be slightly brak. Vineyard gets manure at irregular intervals. Nursery on Jacquez and Aramon doing well.

On Mr. J. du Toit's farm "Klip Drift," we find Hanepoot on Riparia, third year, in fresh low-lying, fairly well drained sandy soil, looking well, except that it is affected with erinose. Green Grape on Metallica (Constantia) well grown and promising good crop; a few sticks here and there on Apricot-leaf Rupestris have died. Mr. Du Toit prefers Aramon and Jacquez to Metallica for these soils, and in future will plant only on them. Big area of Green Grape on Rup. × Metallica (Constantia), six years old, very good. Five years old, on same stock, also doing well; on well drained spots, Metallica proves satisfactory as a stock.

P. D. du Toit's farm "Klip Drift," black, sandy, well-drained soil. Green Grape on Metallica, two years old, very promising. Two years old Hanepoot on Jacquez very fair; erinose evident. Hanepoot on Riparia in similar soil, and under exactly same conditions, doing not nearly so well as those on Jacquez. Mr. Du Toit advocates for his soil: 1st Jacquez, 2nd Aramon, 3rd Rupestris × Metallica (Constantia, or as it is sometimes called right Metallica). Apricot-leaf and Old Rupestris prove total failures. Green Grape on high, well-drained loamy soil, trenched to a depth of 29 inches, produced last season three leaguers per 1,000 sticks. Riparia stands well without irrigation, which is practised on some portions of the vineyard, which consists of about 100,000 vines. Riparia, carrying Hanepoot, 12 years old, bearing a heavy clean crop. Tried some Hanepoot on Metallica, but all died. One year old Green Grape on Aramon, good. Hanepoot on Jacquez splendid. Large nursery on Aramon is all that can be desired with a strike of about 85 per cent. Soil similar to last farm.

Mr. J. C. Deetlif's farm "Groot Eiland" comes next. Bailey on Metallica, three years old, in well-drained, loose vlei soil looking very well. Mr. Deetlif prefers Jacquez to Riparia for Hanepoot, and favours Aramon for other varieties on most of his soil, although he plants Metallica on some well-drained suitable spots.

Cultivation, Drainage, etc.

The whole of the vineyards visited in this district were, without exception, well cultivated. In some of the young plantations we consider that a mistake has been made in not earthing up the young plants when placed in the vineyard. The neglect of this necessary operation accounts for a great number of misses. The union of stock and scion is scarcely perfect the first year, and requires some protection from the glaring sun and drying winds that very often obtain in these parts. No doubt, something is saved by having the union well above ground, as the scion makes no roots and there is therefore no expense entailed in cutting them. But we consider this false economy, as the slight expense for earthing up and cutting roots is not nearly so much as the expense of replacing the greater percentage of misses, without counting the loss of a year's growth.

Drainage is a question that should receive more attention than it has hitherto done. We can confidently say that in most cases where vines are not doing well, bad drainage is one of the principal causes. Although some of the American varieties will grow in fairly moist situations, when soil becomes absolutely water-logged, as we have seen in several instances, no one can expect vines to thrive. It is to be feared that some of the younger vineyards, especially those on Metallica, that are now quite

luxuriant, will, when the roots reach the water level, go off considerably, if they do not die out altogether. Were the drainage improved, many of the brak spots would also be obliterated.

Planting of the young vineyard is often done immediately after the old one has been uprooted, which we consider a rather reprehensible practice. Although in many cases fairly good results have been obtained, how much better would they not have been had the ground been allowed to lie fallow for a year, well manured and worked up into good order for receiving the young plants. Or if some leguminous crop were sown and ploughed in or even taken off green and the stubbles ploughed in with a good dressing of either stable or artificial manure. The tendency to plant the young vines farther apart than the old ones were usually planted is commendable.

As far as disease among the vines of this district is concerned, nothing new has been noticed. Very little oidium was seen, and anthracnose only here and there; mostly among Hanepoot. Many of the farmers have kept it in check by winter dressing with sulphate of iron.

Erinose was most pronounced, but that only over a restricted area. Repeated sulphurings checks this parasite.

Phylloxera is eating its way among the ungrafted non-resistant vines.

Of Stocks.—We find that Aramon × Rupestris, Jacquez and Rupestris Metallica are mostly favoured, and do best.

Jacquez, as well as being a good graft-bearer for Hanepoot, is also a good all round stock, and as such seems to be running about even with Aramon × Rupestris in this particular district. And although its power of resistance to Phylloxera is reputedly low, we have instances in the Colony of Jacquez growing in phylloxerated ground for the last 15 years, and perhaps longer, showing no signs of being affected. Like others of the American varieties, it has its predilections for special soils which are fresh alluvial plains, and it will stand a medium amount of moisture.

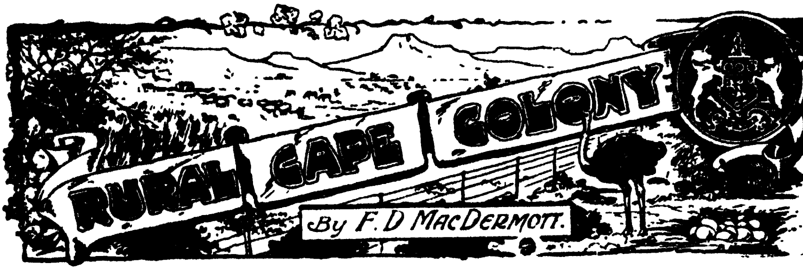
Aramon × *Rupestris* has a far higher resistant power than Jacquez and thrives well under practically the same conditions, and is a far better graft bearer than Metallica in moist situations. It is useless as a graft bearer for Hanepoot, in fact its affinity for many of the Muscat varieties is somewhat doubtful.

Metallica × *Rupestris*. By that we mean the Metallica propagated at Constantia, and which is known over a good part of this district as the "Right Metallica," in contradistinction to other vines mostly Rupestris, that somewhat resemble it. It is, on suitable soils, one of the best stocks, but in this district the majority of the vineyard soils are more suited to the two previously mentioned.

Riparia is another stock that is good, and is favoured by some as a graft bearer for Hanepoot. It is very resistant, and vines grafted on it have a tendency to bear heavily. One objection to it as an all round stock is its inability to keep its scion upright on account of the slimness of its stem. This is certainly a drawback, where vines as a rule are not staked. As its root system is adapted for surface feeding, it is a useful stock where the water level in the soil is high.

The affinity of the stocks mentioned is pretty well established as far as the most commonly grown varieties of vines are concerned. But we should like to see the adaptability of the different types of soils tested with some other varieties such as Rip. × Rup. 3306 and 3309 in clayey more or less damp soils, and Solonis for wet grounds. Also Mouredre × Rup. 1202 as a stock for Hanepoot.

(Signed) I. TRIBOLET.
P. D. DU TOIT.
D. M. HUGO.



No. XXVI.

IN THE DISTRICT OF MIDDELBURG.

The district of Middelburg presents many striking features to those who take an interest in the agricultural development of this Colony, more particularly on the irrigation side, for a great deal of pioneer work has been accomplished there. The mean elevation of the district above sea level would be about 4,000 feet, and it is about two hundred miles from the coast. The rainfall averages less than 15 inches per annum, and consists mostly of summer storms. The general nature of the whole section is hilly with some fairly extensive flats in the lower lands bordering on the rivers and water courses. The soil, generally speaking, is of the Karoo character, and where there is any depth it is particularly rich. The natural herbage is a mixture of grass and Karoo bushes—known as mixed or gebroken veld. It will be seen from this short general description that such a country is essentially favourable to stock-farming A good deal of agriculture has been carried on there, but it is all gradually becoming subservient to the needs of stock which, owing largely to the nature of the soil and the excellent pasturage which prevails in good seasons, thrives splendidly. The altitude guarantees a healthy climate, and disease is conspicuous by its absence.

The Lessons of the Great Drought.

With conditions so favourable it might be supposed that the farmers in such a district had little to trouble them and could rely largely on natural advantages, but it has always to be remembered that South Africa is a dry country subject to severe periodic droughts. In common with most of the upper districts the Middelburg farmers have always this serious drawback to anticipate. At present they are enjoying magnificent seasons, and those who have taken the trouble to think out the water problem for themselves are now co plaining of an embarrassment of riches. It was not always so. For years past no district had to face more serious trouble from drought than that of Middelburg. But, fortunately, the bitter lessons then inculcated were taken to heart and many of the farms are now practically drought-proof. We hear a great deal as to what is being done in other countries where similar problems have to be tackled. But for sheer hard, practical work, it is doubtful if any country could

show better results than those attained by the individual efforts of the pioneers of this section. With a deficient rainfall and no rivers which could be looked upon as permanent streams, with no large reservoirs to draw upon and a country practically bare of trees, this may be accepted as a semi-arid section in every sense. Yet it is gradually being stocked up heavily, and there are indications that before long the stock will increase in much greater proportion than in the past. The pioneer farmers hereabouts were faced from the beginning with the water problem, and it has taken many years to solve it. In the course of the experiments many have gone under but those who have struggled through and the successors of the earlier failures are now well on the way to reap rich harvests.

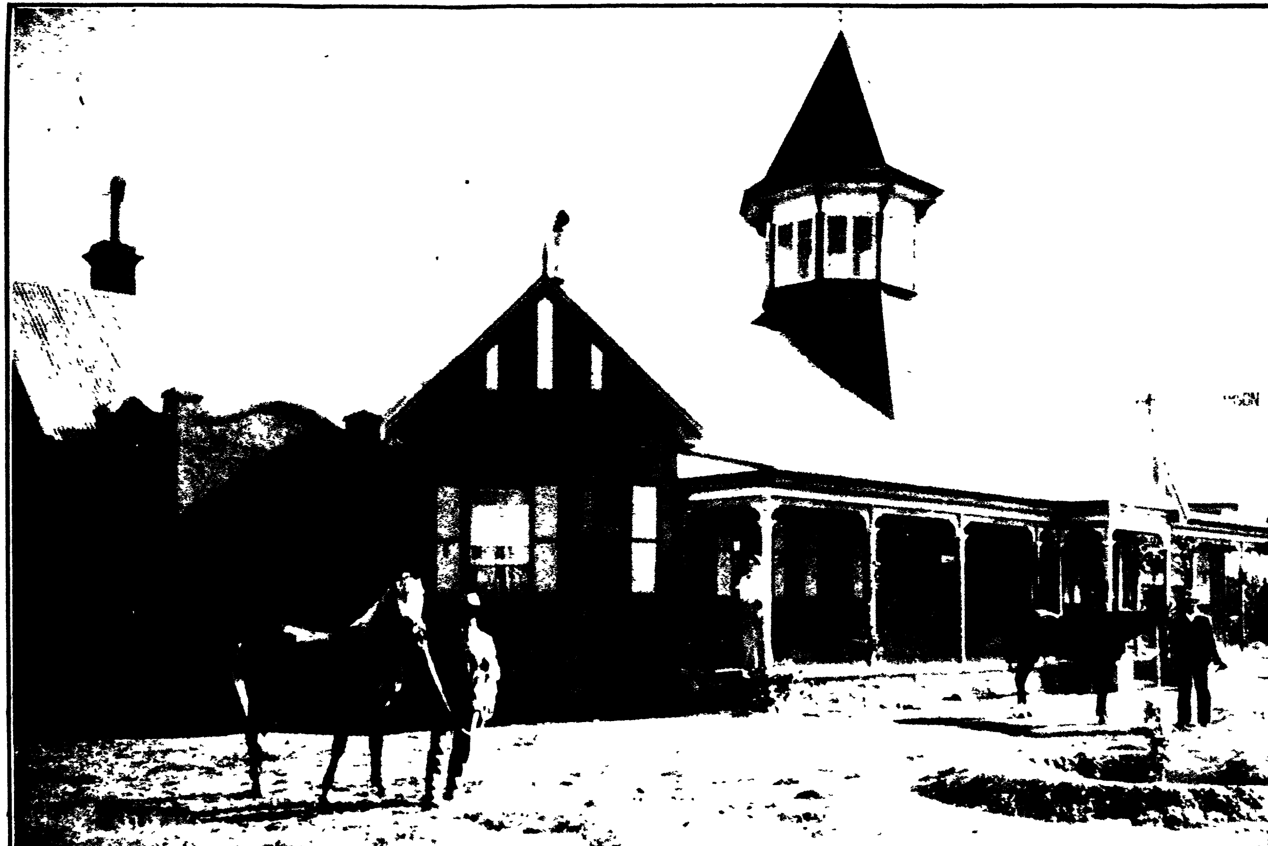
The peculiar conditions which first pointed the way to success have been fully dealt with in the *Agricultural Journal* when the splendid work carried out by Mr. W. R. Southey at Varkenskop, near Schoombie, was described. But Mr. Southey is only one typical of many whose arduous labours have been ultimately rewarded by success beyond their expectations. Earlier efforts were concentrated on attempts to conserve the flood waters which came with the torrential summer rains, and the development of natural springs arising from subsoil drainage. These efforts gave large supplies of water for stock, but the enormous expense of most of the dams constructed to intercept stormwaters on the veld meant great losses through evaporation. Boring has also played an important part in the district in developing underground supplies. But all these sink into comparative insignificance beside the success which has followed on the labours of those who, being fortunately situated on the banks of water-courses, constructed diverting weirs and utilised the storm waters by spreading them broadcast over the veld in time of flood, retaining a proportion in the river bed for the irrigation of their lucerne camps.

This method has served a double purpose. The flooding of the veld has restored, and is still restoring, large areas of good land to grass which was producing nothing but bush, and at the same time holds an enormous quantity of water in the soil which gradually drains through instead of rushing away to the sea and carrying the best of the soil with it.

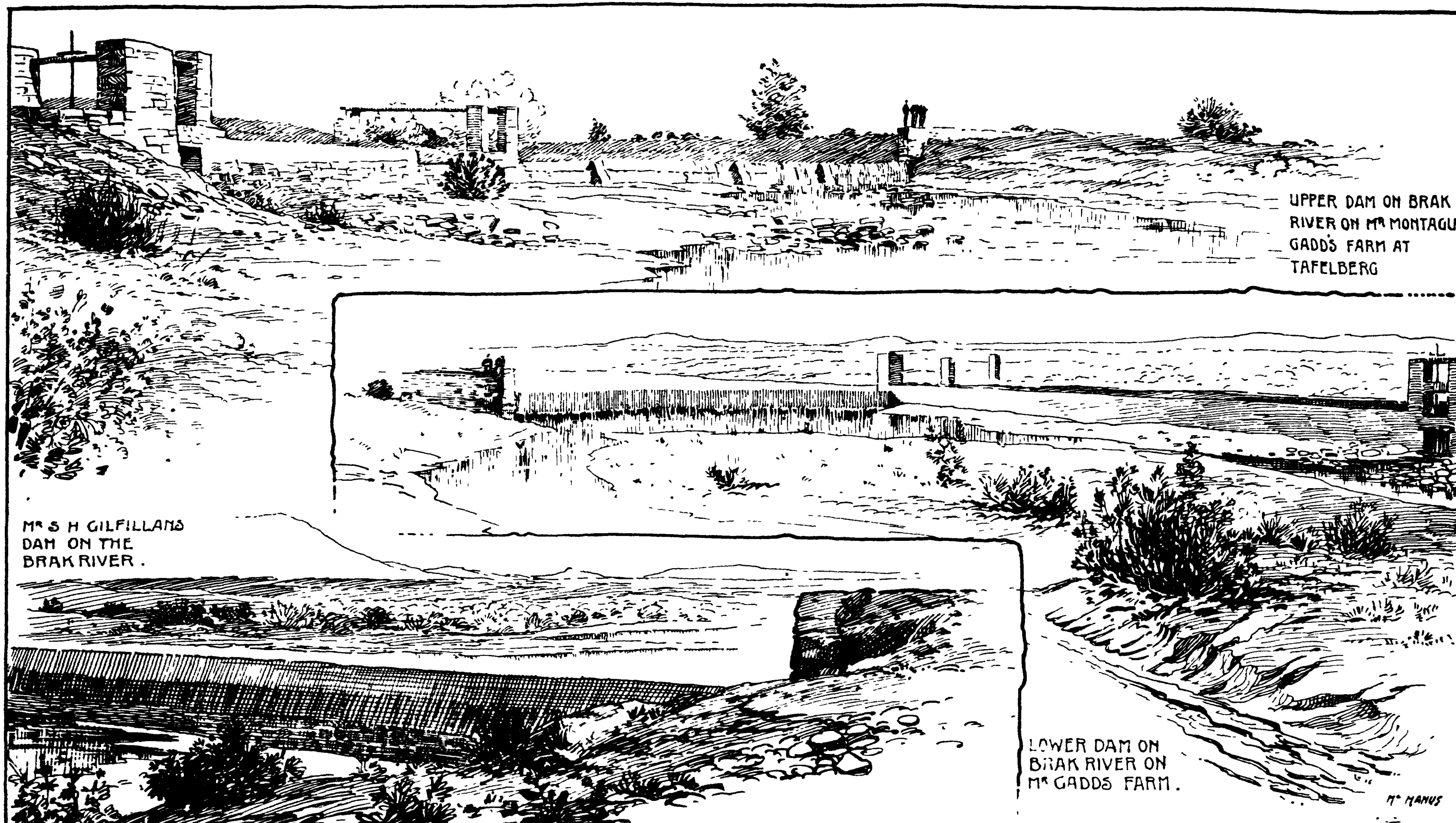
Once water was secured, the next step in advance was the gradual adoption of lucerne as a permanent crop and the substitution of doubtful agriculture for more systematic stock-farming. At the present time there must be several thousand morgen of this valuable crop established in the district, and every season it is being extended. Of course the limit must be reached in time, but it will be a long while yet, so that the future seems bright with possibilities.

THE FUTURE.

The full value of the work accomplished does not as yet seem to be quite realised. The great drought, however, which broke comparatively recently, gave many of the farmers a better idea of the trend of their labours. In some parts of the district the annual rainfall sank as low as 5 in., yet the farmers managed to struggle through, though many were compelled to reduce their stock considerably. This was where the water supply had not been fully developed, and the conservation works were incomplete. But on those farms where plans were anything like mature, the effects of the drought were not nearly so serious. There the full complement of stock was carried and large supplies of reserve fodder stored up, in the shape of lucerne hay, in case the dry seasons continued So seriously were some of the farmers impressed with the long continuance of the drought that they came to look upon it as a normal condition, and regulated their farming accordingly. Now that the drought has broken



At Mr. M. H. Gadd's Homestead "Springfield," with "Saharoni" in the Foreground.


UPPER DAM ON BRAK RIVER ON Mr MONTAGU GADD'S FARM AT TAFELBERG
Mr S H GILFILLANS DAM ON THE BRAK RIVER.
LOWER DAM ON BRAK RIVER ON Mr GADDS FARM.
Mc MANUS

and the seasons are favourable, they find themselves in the pleasant position of being able to do much more on their farms than they ever anticipated. What new developments the changed conditions may lead up to is not quite certain yet. It may induce an extension of existing farming methods by the farmers going in for more stock, or it may result in some of the larger and more fortunately situated properties being sub-divided into smaller holdings. For the present it seems most likely that the policy of development may be continued on the old lines until further experience has shown which is the safest method to adopt in the future, for the great drought has left indelible marks on many and the natural conservatism of the farmer will prevent the majority from taking what they may consider to be undue risks which they might possibly regret.

Every farm in the district is not so fortunately situated as to be able to utilise flood waters. There are many, of course, away from even intermittent streams, where very little can be done in the shape of water conservation, but the necessity for developing water supplies in one way or another has been so deeply impressed upon the majority of the farmers that efforts are being made in many directions to this end.

While visiting the district recently I had not time to make an extended tour, and could only call upon a few of the prominent farmers and see what they have been doing as typical of the trend of events in the district.

Tafelberg Hall.

Leaving the rail at Tafelberg Station the first farm I visited was Tafelberg Hall, the property of Mr R. H. Struben. This is one of the best known properties in the Middelburg district being situated quite close to the railway. It originally comprised three farms which are all now included under the one control, and as there are 13,000 morgen of land altogether they must take a good deal of looking after. This property previously belonged to the late Mr. Distin, who spent a good deal of money on it in the shape of stone-fencing and substantial stone buildings, kraals, etc. He also constructed a large dam covering about fifty acres which forms a magnificent sheet of water when full. This splendid property came into Mr. Struben's possession in 1898, and he has had to stand the brunt of a series of drought seasons which would have tried the spirits of a Mark Tapley. In addition he was compelled to go through the disturbed period of war and rebellion which brought things almost to a standstill in most of the Midland districts. In spite of these trying conditions the present owner has managed to do a great deal of further development work which has improved the property very much. The Little Brak River runs through the lower part of the farm and a substantial weir diverts the flood waters over a considerable area, part of which is laid down to lucerne. The rest of the ground served by this weir is for grazing purposes, and the periodical floods serve to keep it in a much better condition than it could possibly be with the normal rainfall only. On the upper part of the farm four boreholes have been sunk which yield under pumping about 60,000 gallons each daily, and three others which flow yielding in all upwards of half a million gallons. On one a syphon has been fixed which acts very satisfactorily, the others that do not flow being worked by windmills. Prior to the boreholes being sunk, all the stock on the farm practically depended upon the dam water for drinking purposes, but the great drought demonstrated the necessity for additional supplies if the property was to carry anything like a payable quantity of stock. The arable lands comprise something like 120 acres, 70 of which are laid down to lucerne and the balance to cereals, such as barley, oats and mealies. As the water sup-

ply is further developed, Mr. Struben proposes to devote a much larger extent of land to lucerne, and as there are some fine stretches of fairly level ground which promise well for this crop, there can be little doubt as to the wisdom of this plan.

On an extensive property like this, however, there is so much to be done that the marvel is how development schemes calling for so much time and trouble can be carried out in addition to the ordinary work of the farm. Many miles of wire fencing have been constructed in addition to the extensive stone-walling done by the previous proprietor. The farm is now not only completely enclosed, but is fenced off into large camps or paddocks while there is still much to be done in this direction.

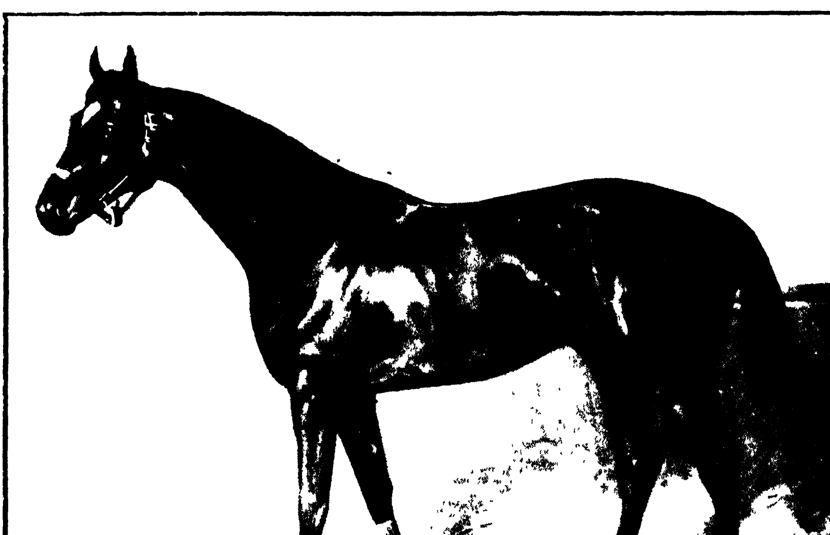
Previous to the drought this property was known to carry large quantities of stock. As many as 500 ostriches were grazed here at one time with 500 cattle as well all on the veld The stock has been reduced through the drought, and the farm is not stocked nearly so heavily now, the birds having been brought down to about a couple of hundred with about the same number of cattle and some 3,000 merino sheep of the Rambouillet type. The homestead is a modern commodious stone building erected comparatively recently, the original homestead having been destroyed by fire. Trees have been planted quite close up to the house, and they seem to thrive well, but they so completely close it in that nothing can be seen of it until one is almost at the door. Pleasant gardens and a small orchard are laid out near by, with a pretty piece of water in front overhung with well-grown trees which has quite an attractive appearance.

In addition to the cattle, ostriches and sheep on the farm, Mr. Struben does a little in horse-breeding, using an imported Arab sire, "Somandel," on country mares, with satisfactory results. He tried half-bred Hackneys as dams, but has now gone back to the Cape mare In cattle he finds an Afrikander-Shorthorn cross to give most satisfactory results.

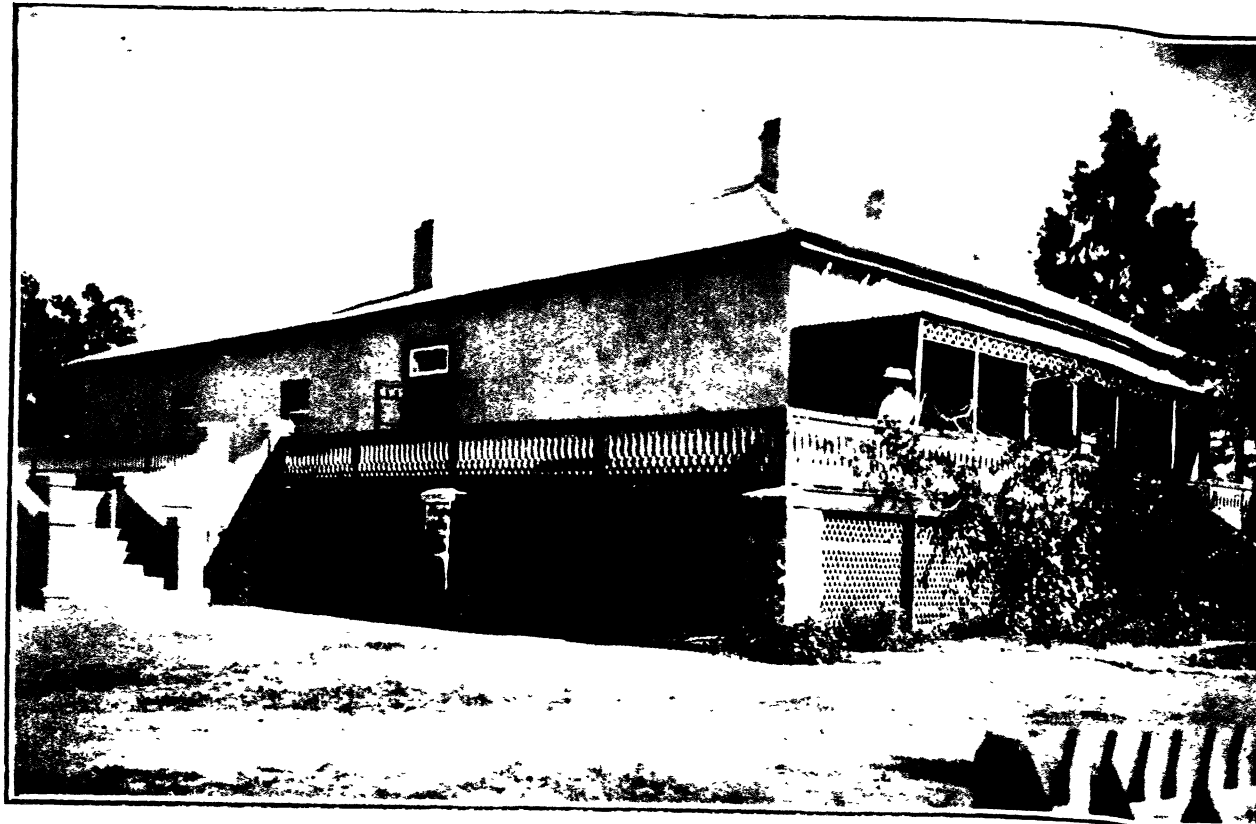
With Mr. M. H. Gadd at "Springfield."

To the east of the railway and within a stone's throw of Tafelberg Station is the homestead of Mr. Montagu Gadd, the well-known breeder and successful exhibitor of pure-bred Persian sheep. "Springfield" is some 3,700 morgen in extent, and is so level as to present quite an unattractive appearance to the eye. The Little Brak River, after leaving Tafelberg Hall enters this farm and continues through it for some distance until it reaches the farm of Mr. S. H. Gilfillan, Glen Heath. The monotonous stretch of almost dead level ground which forms the greater part of "Springfield" has its advantages, however, and these have been made the most of. Like the majority of the pioneers in this district, Mr. Gadd's energies have been mainly directed to securing water. This he has succeeded in doing, though at great expense of time and labour. He has two weirs on the river, one at the upper end of the farm and one lower down, and, as will be noticed from the sketches herewith, each is an extensive piece of masonry work which must have cost a good deal to construct. The weirs themselves have had to be supported by lengthy walls on the banks of the river in order to protect the leading furrows, and these again have had to be fitted with large iron sluice gates to control the flow and to get rid of the constant deposits of silt which come down with the floods. The water from the upper weir is used for irrigating the lucerne lands, of which some 120 acres are established and more projected, the surplus storm water being thrown on the veld. The lower weir is also used for flooding, and between them a very large volume of water must be available

Mr. M. H Gadd's Prize Persians. The Ewe in the foreground holds an unbeaten record.



A Noted Middelburg Stallion "Pearl Diver" (from a painting).
"Pearl Diver" was the property of Mr. Charles Southey, and stood at Culmstock for 23 years. He is now dead, but as he was probably the greatest thoroughbred sire this country has known his memory will not soon be forgotten.



A Middelburg Homestead—"Culmstock," the Residence of Mr Charles Southey.

when the river is in flood. A remarkable feature showing the effect of flooding the veld was pointed out to me as we drove round the farm. The flats below the homestead, and bordering on the river have been subjected to periodic flooding for some time past and after the heavy rains of the past season were so wet as to be more like a vlei than Karoo veld. Grass, a couple of feet high, covered land which at one time carried little else but Karoo bushes, and the bushes are beginning to show signs of dying off, for they cannot stand continuous moisture. A question suggests itself here whether it will ultimately be found to be profitable to get rid of the Karoo bushes in such places and encourage grass in their stead. The former are so valuable in themselves that it seems a pity to sacrifice so much fine herbage with such strong drought resistant qualities unless the land is to be brought under a permanent crop like lucerne, and these flood waters used for irrigation. It may be, of course, that it is only in exceptional seasons that the floods are sufficiently frequent to keep this ground constantly wet. But in any case it should be a point worthy consideration by farmers hereabouts and those in similar circumstances. To have even to suggest such a question is an ironical comment on the perversity of things South African; but the question exists, and it calls for careful attention. For years past these farmers have been struggling against the forces of nature in order to secure sufficient water to enable them to carry on in semi-arid conditions. And when their efforts are crowned with success the seasons change, and they have more water than they know what to do with. The only consolation they have is the knowledge that the droughty cycles are bound to recur, and when they do they will be prepared for the worst.

The Arab Stallion "Saharoni."

It must not be supposed because Mr. Gadd is referred to here as a noted breeder of pure Persian sheep that his farming operations are confined to one particular line. "Springfield" is a stock farm conducted on sound general lines. Ostriches are a strong feature; cattle, woolled sheep, and horses also play a part in the general economy of the place. Among the horses is a handsome grey Arab stallion, "Saharoni," a prize winner of some note. He was bred in England of pure Arabian stock. His sire was Sir Wilfred Blount's "Ahmar," and his dam, "Zerga," a desert bred mare purchased by Sir Alfred Pease, from the Kaid Ahmed ben Chuin, Kaid of the Oulad Nails, of Ain Rich, Bon Saada. Sir Alffred Pease, in 1898, took her across the Algerian Sahara to the Mzab Desert and to Wargla, and on returning north went into the snows of the Aures Mountains. Sir Alfred said of her that she stood every kind of hardship from heat to cold, thirst and semi-starvation, and she was never sick, sorry or lame during the years he had her at home and abroad. A photograph of "Saharoni" appeared in the May issue of the *Agricultural Journal*.

Long Woolled Persian Sheep.

While at "Springfield" I had my first opportunity of seeing the so-called long woolled Persian sheep which were imported some time back through Messrs. Moss and Wardrop, of East London. Judging from their appearance they seem to belong to the Asiatic group of mountain sheep, and could scarcely be classed with the smooth-haired, black-headed, fat rumped sheep, we recognise as the Persian in this Colony. Their fleece is long and coarse, and seems more of the nature of a carpet wool, in fact it would not be surprising to learn that these are the animals whose fleece is

worked up into the famous Persian rugs known to commerce the world over. These animals seem to be doing very well at "Springfield," but they do not impress one as likely to prove a better investment than the Merino. If they were introduced to the heartwater area, and resisted that disease as well as the black-headed variety, they would prove of some value to the country. But it is difficult to see what advantage is to be gained from keeping them on a healthy Karoo farm. The only justification for their introduction would be to show that a woolled sheep is procurable that can live and thrive in heartwater areas as well as the black-headed Persian.

(To be continued.)

AGRICULTURAL UNION OF CAPE COLONY.

TENTH ANNUAL CONGRESS.

The Tenth Annual Congress of the Agricultural Union of Cape Colony was opened in the Town Hall, Port Elizabeth, on Wednesday, May 15.

The Delegates.

The following delegates were present.—
Stellenbosch: Messrs. W. A. Krige and W. van der Byl.
Humansdorp: Mr. J. M. Rademeyer, M.L.A.
Britstown: Messrs. T. P. Theron, M.L.A., and J. A. Mugglestone.
Molteno: Messrs. S. A. Cloete and Cuthbert A. Pope.
East London: Messrs. C. P. Pe[illegible], Will Crosby and J. Gerber.
King William's Town: Messrs. Alfred Everitt and Jas. MacIntyre.
Aliwal North: Messrs. J. D. McNally, D. J. Moore and J. Reich.
Queenstown: Mr. W. A. Berry.
Bathurst: Messrs. R. W. Estment, R. Caten and Stephen Smith.
Worcester: Mr. D. M. Hugo.
Darling: Mr. C. J. Duckitt.
Malmesbury and Piquetberg: Mr. A. C. de Villiers.
Middelburg: Messrs. Ewart J. Collett, J. S. Minnaar and W. Stahl.
Paarl: Messrs. W. Shaw Nicholson, Rocco de Villiers and C. C. A. de Villiers.
Western Province (Agricultural Society): Messrs. H. Reid (Durbanville), J. C. Faure (Eerste River), R. H. Struben (Tafelberg), P. R. Malleson (Hex River), and P. A. Myburgh (Paarl).
Richmond: Mr. J. van der Merwe.
South African Stud Book: Messrs. O. E. G. Evans and C. G. Lee (President).
Bedford (Ram Breeders' Association): Mr. T. W. King.
Cape Flats: Messrs. Howard H. Staplee and George Smit.
Koonap: Mr. A. W. Douglass (Heatherton Towers).
Oudtshoorn: Messrs. Will Allan and E. T. L. Edmeades.
Albany: Messrs. T. T. Hoole, M. B. Walker and H. Fitchat.
Cradock: Messrs. H. J. Collett and P. J. J. Coetzee.
Port Elizabeth: Messrs. A. W. Guthrie, J. Lamb, G. S. Whitehead, E. J. Geard and C. H. Mackay.
Bayville: Mr. B. K. Mayo.
Bredasdorp: Messrs. J. D. Albertyn and F. F. Pratt.
Caledon: Mr. C. G. Human.
Robertson: Messrs. P. J. de Wet, D. Bruwer and G. Marais.
Dordrecht: Mr. D. M. Brown (proxy).
Mr. P. J. Hannon, Superintendent of Co-operation, was also in attendance.
Hon. Secretary: F. D. MacDermott.

The Late Director of Agriculture.

The President (Mr. C. G. Lee) said he desired, before entering into the agenda of the Congress, to move a resolution in connection with this Colony's and South Africa's great loss, the death of the respected Director of Agriculture, Dr. D. Hutcheon. He moved:—"That this Congress, having learned with the deepest regret of the untimely death of the late revered Director of Agriculture, Dr. D. Hutcheon, M.R.C.V.S., respectfully tenders its sympathies and condolences to the bereaved widow and family; and further desires to place on record its high appreciation of the great services rendered to this country by that capable and sympathetic

officer. His work for South Africa will live and carry his name to posterity as one of the great veterinarians of the age. His great knowledge, genial personality, his untiring energy in the interests of the farmers of this country, his masterly tact and administrative ability will leave a gap in the public service of this Colony most difficult to fill." The President added that much could be said, but under present circumstances they felt very deeply in the matter. He believed and he thought they would all agree with him, that in the near future, some tangible recognition would be made of the late Dr. Hutcheon's able services which would carry forward great benefits to future generations.

The resolution was assented to in silence, the delegates standing.

It was approved that copies of the resolution be forwarded to the Minister for Agriculture and telegraphed to the widow.

The Annual Report.

The annual report of the Executive was as follows:—Gentlemen,—The past year has been an eventful one for agriculturists in this Colony, for not only has it proved to be exceptionally favourable, in consequence of the seasonable heavy rains, but it has seen several marked advances which must ultimately react favourably on the whole of our Agricultural Industries.

The policy of supporting and forwarding Agricultural Co-operation adopted by the Government has been further extended, and once the principle is thoroughly understood, should prove of permanent value to the farmers. The vine and fruit growers have begun to feel its advantages, even at this early stage, for had it not been for the help extended under the Agricultural Organisation Scheme, it is safe to say that some difficulty would have been encountered in the districts affected owing to the heavy crops and depressed markets.

The Dairy Industry has benefitted to some extent also, and there now seems a prospect of this branch of Agriculture developing on sound lines in the immediate future. Whatever mistakes may be made, the principle of co-operation, once thoroughly understood and wisely applied, should bring to these industries particularly very great and lasting advantages.

With favourable seasons our farm stock are increasing rapidly once more. With the exception of the visitation of locusts and the recurrence of several animal diseases, consequent partly on the good seasons, the prospects are very bright.

The replies of the Government to the various resolutions passed by the Congress last year are submitted to Congress, and particulars as to further correspondence which has passed on the various subjects will be laid before you. These and several other matters have received the attention of your Executive during the year.

Among other important subjects to be submitted for the consideration of this Congress is a communication dealing with the increasing number of Agricultural Shows held in the Colony. The honourable the Secretary for Agriculture urges the careful consideration of some scheme by which shows might be held in certain centres in alternative years. A full expression of opinion is asked for, as it is felt that the claims for contributions from the Government are likely to exceed the amounts voted by Parliament.

Another subject that the Department of Agriculture asks this Congress to consider is that of the costs incurred for the travelling expenses of Judges.

These questions have been discussed by the Executive, and correspondence ensued with the Agricultural Department, particulars of which will be laid before you.

During the past year some difficulty was experienced in satisfactorily allocating the dates of many of the Agricultural Shows, owing to there being so many asking for fixtures. Your Executive would urge that this subject be carefully considered, with a view to arriving at some definite arrangement which cannot be departed from. Correspondence will be submitted showing the absolute need of coming to some conclusive understanding on this question, as in at least one instance the departure from original fixtures gave rise to serious and unnecessary feeling. The position as it stands is that, though the Union may arrange dates, it has no power to compel individual societies to adhere to same, and should they elect to make any change to suit their own convenience, the Union has no machinery to enforce its mandates. Such a state of things is manifestly unworkable, and it remains for this Congress to devise some plan by which it may be obviated.

As will be seen by the agenda, many subjects of vital importance to the Agricultural Industries of this Colony are submitted for discussion, with the object of obtaining fully thought out decisions, and your Executive trust that these will be dealt with accordingly.

The Executive regrets to have to report that its endeavours to bring about some form of unification with the other bodies interested in forwarding Agriculture have not, so far, reached that stage in which anything approaching a satisfactory advance can be reported. The Farmers' Congress, after debates in which some personal feeling was manifested, postponed the consideration of all proposals to this end to a future date. This is to be regretted, for this Union had hoped that the beginnings of some workable understanding would have been arrived at before this Congress sat. Several meetings were held with the representatives of other bodies interested, but as the upshot of these was that each should be confined to a definite sphere of labour—in the case of the Agricultural Union, keeping it to affairs pertaining to Agricultural Societies and Agricultural Shows—your Executive felt it would be better to continue its liberty of action than to tie itself down to such narrow lines. It is hoped, however, that in time wiser counsels will prevail, and the need for unification be gradually recognised.

In order to secure as full a representation of the Agricultural industries of this Colony as possible at the Inter-Colonial Agricultural Union, your Executive took upon itself to invite the Farmers' Congress and the Vine and Fruit Growers' Congress to officially nominate a proportion of the delegates to attend the August Conference of the above body, to be held in Pretoria. The Farmers' Congress came to no decision on this invitation; what the Fruit Growers may do will be decided this week, as that Congress opens to-day at King William's Town.

As this Union includes representatives of each of these bodies, it can, as in the past, send delegates fully qualified to speak for every Agricultural industry in this Colony, and your Executive wishes it to be distinctly understood that in extending these invitations it was actuated entirely by a desire to promote the beginnings of unity between this Union and the other bodies concerned.

Your Executive has again to acknowledge its deep indebtedness to the Secretary for Agriculture and the Director and staff of the Agricultural Department for much helpful sympathy, assistance and courtesy during the past year. A great deal of correspondence has passed with the Department, and in every case the utmost consideration has been received by this Union.

To the Parliamentary Members of the Union, too, we owe our thanks for the earnest manner in which they worked during the Session in forwarding the desires and interests of all sections represented by the Agricultural Union. Their assistance and deep appreciation of the importance of our work has been invaluable in maintaining and forwarding the objects we have in view.

In conclusion, your Executive feels that the Associations affiliated to this Union should be congratulated upon the fact that so large and influential a body of delegates has been deputed to attend this Congress, and trusts that its deliberations will bring valuable and permanent advantage to the Agricultural industries of this Colony.

THE PRESIDENT'S ADDRESS.

The President (Mr C. G. Lee) then delivered his opening address as follows:—Gentlemen,—I most heartily welcome you to this gathering. In submitting to you the Annual Report of your Executive, I must first congratulate the whole Agricultural community upon the excellence of the past season, and the bright prospects that are indicated for the immediate future. The abundant rains have rehabilitated the Eastern, Midland and North Western stock districts and everything points to the promise of a continuance of prosperity for those portions of the Colony. In the West and South-West the seasons have also been fairly favourable, and with the stimulus now given to the better organization of all agricultural industries, and the furtherance of co-operation, the outlook is more encouraging in every part of the Colony than for many years past. Production is increasing in every branch of Agriculture to such an extent as to fully justify the belief, which has always been held by those with the fullest and broadest knowledge of our condtions, that Agriculture must eventually prove the great reservoir of our national wealth. The country generally is passing through a period of depression, it is true, but even adversity has its uses, and in our case it is evidently a blessing in disguise, for at no period of our history as a settled community has so much intelligent interest been concentrated on industries associated with the cultivation of the soil. It is sincerely to be hoped that this will now continue, and that above all

OUR GREAT STOCK INDUSTRY,

for which our conditions are so pre-eminently fitted, will be fostered and encouraged till it reaches its natural dimensions. In the evolution of states such as ours, production must always precede its sister art, manufacture. We must first become, to a greater extent, a nation of producers, not only of mineral wealth, but of foodstuffs and other necessaries of life, before we can grow into an industrial community With a plentiful supply of foodstuffs it is possible to profitably establish such other industries as should eventually make us more and more self contained, and may even possibly enhance the value of our raw products by providing a population to consume our own manufactured articles. Without production the first stimulus to manufacturing industry is absent—the provision of raw material. The steps recently taken by Government in offering support to co-operative efforts are in the right direction, and even though they may not prove completely successful at the outset, I, for one, sincerely trust they will be continued as a national policy. Mistakes may be made and others follow, but the underlying principle remains. We, as a people, should associate ourselves as closely as we possibly can with any policy that is calculated to promote and increase production, firmly resolving not to be rebuffed by want of success, either through miscalculation or errors of judgment, but profit by such mistakes, and while continuing with persistence on the lines laid down, to take good care that the same mistakes are never made a second time. In addressing so influential a gathering, fully representative of practically every part of this Colony and every Agricultural industry of importance, I wish again to refer to the necessity of supporting and encouraging in every possible manner our great stock industry. There are many important factors which go to swell the sum total of the farming wealth of this Colony. The vine and fruit industries, particularly in the Western Province, support in comfort a large proportion of the population of those districts, and call for the application of much that is best of the energy and intelligence of the farmers there. They have another virtue, which is not always fully recognized—they allow of a comparatively close occupation of the land; for the man who has fifty acres of well-established fruit trees or vines is in comparative affluence. The grain farmers, too, along with the general cultivator, plays an important part in the national economy. But, gentlemen, these industries sink into comparative insignificance beside the great stock or animal industry of this Colony, with exports ranging over six millions sterling per annum in the shape of animal products. The exports of fruit are growing yearly, and I trust to see them continue to expand. It is even hoped that we may establish an export trade in wine, which I also fervently trust may be realised. The grain farmer, too, thanks to the introduction of rust-resisting varieties of cereals by the Agricultural Department, is gradually increasing his output, season by season, in the face of most serious difficulties, and it is hoped that we may in time at least supply ourselves with breadstuffs, and thus be independent of the imported article. But, gentlemen, let me show you

WHAT THE STOCK FARMER IS DOING,

and what he can do in the future as his share of bearing the national burden. He is now producing sufficient beef and mutton to very nearly meet the wants of the whole community, and with the continuance of good seasons he hopes to produce more, The importations of chilled and preserved meats of all kinds are gradually decreasing, and we hope in time to see them cease altogether. In addition to that he exported last year

animal products, in the shape of wool, mohair, ostrich feathers, skins, hides and horns, and live animals, valued at upwards of six millions sterling. The returns published by the Statistical Bureau for the year ending December 31st, 1906, show the following remarkable facts: The total value of the exports of diamonds produced in the Colony during that year was £6,831,825. The total value of animals and animal products exported during the same period was £6,143,065. These were made up as follows:—

Living Animals—			
Cattle	43,093	head, valued at	£421,630
Horses	5,186	„ „ „	166,957
Mules and donkeys, etc.	4,497	„ „ „	59,767
Pigs	2,121	„ „ „	6,181
Poultry		„ „ „	1,950
Sheep	281,112	„ „ „	332,954
Other animals		„ „ „	36,557
Total			£1,025,996
Ostrich Feathers		valued at	£1,412,991
Angora Hair		„ „	796,184
Hides, Skins, etc.		„ „	701,805
Horns		„ „	5,289
Wool		„ „	2,200,800
Grand Total			£6,143,065

So that the Stock Farmers of this Colony are beginning to tread very closely on the heels of the great diamond mining industry, and I trust before long to see our exports of animal products doubling themselves But in addition to this we have another vast field before us, for when one looks at the import returns for the same period and sees that this Colony imported and consumed about three million pounds worth of other articles we might have produced for ourselves it gives one cause for thought. One feature we stock farmers can point to with pride, and that is that none of this money goes out of the country to pay dividends on foreign capital. Now this was all done after periods of great difficulty. Disease, drought and war have decimated our flocks and herds in the immediate past. Thanks to the untiring efforts of such men as Dr. Hutcheon, our great Veterinarian, Mr. C. P. Lounsbury, the Government Entomologist, and the staffs who have so ably seconded their patient investigations and untiring labours, we are beginning to get a better understanding as to the causes of the many diseases which have affected our stock, and we are gradually being provided with preventive and remedial measures, which fortify us against their recurrence in the future. Now, gentlemen, if the Stock Farmer has done so much in the difficulties of the past may we not fairly presume that with the more favourable conditions prevailing he may be expected to do better in the future. But he also needs encouragement and support, though not perhaps in the same form as his brother producers in other branches of farming. He needs the aid and assistance of competent veterinary advice, he needs the helpful sympathy of sound laws to enable him to carry on his work with the least possible loss and friction. These subjects will come before you for consideration, and in dealing with them I trust you will exercise that clear judgment which has heretofore characterised your deliberations. Just another point I would like to mention and that is the pressing necessity of

IMPROVING OUR STOCK,

if this great industry of ours is ever to realise our best hopes. In several directions the work of improvement is proceeding at a goodly rate. This is, undoubtedly, in a great degree due to the labours of your Agricultural Societies and their Annual Shows, which do so much to encourage emulation. Another helpful factor in this direction is the South African Stud Book, which may be claimed as largely a creation of the Agricultural Union. I need scarcely ask any Congress of that Union to continue its hearty support to both Agricultural Shows and the Stud Book. But in addition I would like every member of this Union to join with me in preaching and practising an eternal crusade against the perpetuation of what I may call the uneconomic animal. The animal that consumes as much or more than the thrifty one, but produces much less and at times nothing at all. This calls for no special pleading, it is merely a matter of plain calculation. Whether an animal lives on the veld, or is stalled in a barn, if it does not give a fair return it is taking the place of one that would do so, and as a just consequence, should be ruthlessly swept away. Our woolled sheep industry, our Angora and ostrich industries, are realising the force of this truth rapidly, with the result that nothing but the best is now demanded. Of course there are, and always will be, differences of opinion as to what is best. My experience is that that which thrives best and gives the best returns in the special conditions by which the farmer is surrounded is the best in all cases. And it is just here that the farmer must exercise his individual judgment. Let us take as an example the growing industry, recently launched on a large scale, of dairying. It is the duty of every cattle farmer in this country who has any desire to see this industry prosper, to turn his attention to the production of more and better milkers. In fact there are many of us who hold that this should have been assured before so many of these factories were established. But that is by the way. Some may ask why the cattle farmer should take up this particular line in preference to any other? The answer is because it lies at the very foundation of the business. The production of oxen for transport work is practically dead. Speaking generally, the cattle man's occupation in life now is mainly to produce milk, to be marketed as dairy products, and beef for the butcher. Now it stands to reason that the cow which gives the largest returns in dairy products is the type to encourage, because it means that the nearer we approach the possible in quantity when an industry begins to reach the wholesale stage, the bigger return the farmer gets per acre. The future of the cattle industry in this country undoubtedly lies largely in dairying, and the sooner we establish a type of milker which enables us to produce large quantities of the manufactured article the sooner will that industry become so firmly established that nothing can shake it. And then, and not till then, will the cattle farmers reap the full reward for their efforts. It will not come in the shape of high prices for small quantities, but will consist of a regular and adequate return, which, though giving but a small profit per gallon on the milk produced, will be a handsome income because of the great increase in the output and the consequent reduction in the costs of handling—a result which always follows when any industry enters the wholesale stage. Add to this the production of fodder such as lucerne and paspalum grass, of which a proportion should always be stored in case of bad seasons, and there is no reason why dairying and the resultant production of a large supply of good beef should not in time approach the dimensions it has attained in other countries, notably New Zealand, New South Wales and the Argentine. We have a healthy climate; we are beginning to learn how to forestall

most of the troubles and dangers which brought disaster in the past; we have at least two unique industries in which we can hold our own against the whole world in ostrich feathers and mohair, and with the addition of a great dairying industry established on sound lines, this poor old Colony, which has had to depend so long on oversea supplies for its meat, its milk, its butter and its cheese, should, before long, awake to find intself recognised as one of the world's great providers of animal products.

Co-operation a Necessity.

To bring these things about, gentlemen, it is imperative that we should work together—otherwise co-operate for the common good. This Union has this principle as one of its guiding objects. It has endeavoured to bring together the townsman and the agriculturist and interest them all by means of annual gatherings such as this in the better and most advanced forms of agriculture. We may not always have succeeded in our endeavours though we shall, I trust, continue our work in this direction. I regret to say that we have to face at the present moment what is undoubtedly a temporary check to these ambitions. The more sanguine among us had hoped that it should be possible to arrive at some kind of a working understanding with the other bodies which represent various branches of agriculture in order that some form of unification could ultimately be established. There can be no doubt as to the identity of interests which exist between such bodies as the Agricultural Union, the Farmers' Congress and the Horticultural Boards or Vine and Fruit Growers' Congress. We are all endeavouring, according to our lights, to work in the same direction. Unfortunately, owing to the fact that each of these bodies deliberates apart from the others, there is a danger of views clashing and work overlapping. This leads to a great diffusion of energies, a lack of concentrated action and a consequent ineffectiveness in dealing with the more important questions which affect us all. It had reached such a stage that the Agricultural Department circularised the various associations, which form the bodies mentioned above, suggesting the advisability of some form of unification This Union, through the Executive, then moved in the matter. It is to be regretted that the first steps taken were, through want of exact information, completely misunderstood. The Farmers' Associations were circularised direct asking them to become affiliated to the Agricultural Union. This was taken by the Executive of the Central Association to be a direct attack upon the authority of that body and an attempt to weaken it by inducing the Farmers' Associations to withdraw from the Farmers' Congress. It need hardly be stated that nothing was further from the thoughts of the Executive of this Union. However, the misunderstanding exists and has been made the excuse for a good deal of bitter invective directed against this body. When the question was discussed at the Farmers' Congress last year, it resulted in an instruction to the Executive to negotiate on the basis of a definition of spheres of labour. The two Executives met on two occasions, and the case was discussed fully, but we were always faced with this claim for a definition of spheres of labour, which we hold to be disunity instead of unification. At the last meeting held in Cape Town, at which representatives of the Western and Eastern Fruit Growers were also present, this aspect was forced to a division, when the Union found itself in a minority. Resolutions were there adopted that each cobbler should stick to one particular last, your representatives only dissenting. The reason of this was that the only "sphere of labour" left to this body was that of attending to the needs and wants of Agricultural Societies and Shows. We felt this to be altogether too narrow and even dangerous, for had we accepted it, the doors of the

Temple of Unity would have been indefinitely closed. Whereas so long as we maintain our right to act independently on as broad a basis as we think justifiable, there is always an opportunity for further negotiation. We therefore declined to fall in with the suggestion. I may add that one valuable suggestion was adopted which we accepted wholeheartedly. This was that

A Council of Agriculture

should be established to be formed from the various bodies interested which should be the voice and representative of all of us. As we felt compelled to decline the part assigned to us, but still wanted some form of unanimity, we invited the Farmers' Congress, and have extended the same invitation to the Fruit Growers' Congress to nominate delegates to share officially with this Union the representation of the Agricultural interests of this Colony at the Annual Congress of the Inter-Colonial Agricultural Union. I regret to state that at the recent Farmers' Congress at Oudtshoorn these pacific overtures were not kindly received, and there the matter stands. What the Fruit Growers may decide we have to learn, for the matter is to be discussed this week at King William's Town. A further suggestion, offered by the Hon. C. W. H. Kohler, Chairman of the Western Province Horticultural Board, that the three bodies should hold a joint Congress, forming itself into sections for the discussion of sectional subjects, was also shelved, so we seem as far off unity as ever. But, gentlemen, I do not despair. The issues involved in the future of agriculture and their influence on the whole country, are national not sectional. To arrive at a satisfactory solution of the many subjects which face us, we shall need the advice and assistance of the ablest in the land whether farmer or townsman, and when, as in our case, we can manage to combine the two, we feel we are on the road to success. Our erring brethren who take a different view—for we cannot for a moment credit them with any desire to purposely perpetuate disunion—will come round to our view sooner or later. When they do so we shall, I am sure, be only too glad to meet them more than half way. I, personally, and I know many of you think with me, am not wedded to any particular formula. Should any reasonable scheme be evolved, I would willingly accept it. All I want is unity and co-operation. All who take a live interest in forwarding agriculture I welcome as co-workers. If the merchant chooses to display his interest by devoting his spare cash to the support of Agricultural Shows I appreciate him as a friend of the Agriculturist; and when, as is the case with many members of this Union, the townsman is also a large farmer devoting the money he makes in business to the development of the land he lives in, then I say he is doubly welcome to our deliberations. My regret is that the farmers of this country do not respond more readily to the encouragement offered by townspeople in the shape of Agricultural Shows, that they do not take a more active part in the working of these institutions, and thus get into closer touch with the business methods of the commercial man. Such intercourse is good for both of them. I am

Very Hopeful for the Future,

more especially when I see an increasing number of farmers joining hands with the townsmen in holding the thirty-five Shows that were held this year. The Agricultural Societies affiliated with this Union and those who may not yet have joined have a great work before them. They are, and will be still greater educators of almost immeasurable good. They are

adjudicators, awarding various orders of merit to the exhibits they encourage. They are a sound advertising media, and last but not by any means least, they provide at their meetings and Shows a common ground for many who would otherwise never meet, for work of mutual benefit. These Societies, therefore, are taking part in the work of gradually and surely cementing together by good friendship, the white races of this Colony. I am persuaded you all realise the great responsibility in which we are placed here, and that our deliberations will be carried on with forbearance, even though it may not be possible to exactly agree in debate; and that time will be economised to the greatest possible extent, without derogating from the importance of any subject. I cannot close without expressing my great appreciation of your Secretary's work. It was a graceful act on the part of the Honourable the Minister for Agriculture to suggest Mr. MacDermott as your Secretary. It was a helpful step when he accepted that position, and though he has given us some of his time, the *Agricultural Journal* has grown in every way, and is ever increasing its influence by sowing broadcast the good seed of agricultural development on the soundest lines. Gentlemen, I will now formally move the adoption of the Annual Report. (Cheers.)

Mr. O. E. G. Evans having seconded, the report was adopted.

The Town's Welcome.

The Mayor (Mr. A. Fettes) formally waited upon the Congress and welcomed it to the town. Mr. A. W. Guthrie, President, Port Elizabeth Agricultural Society, also offered a warm welcome, which was heartily endorsed by Mr. W. Macintosh, M.L.A., on behalf of the Chamber of Commerce.

The Congress then proceeded to deal with the agenda.

Agricultural Shows.

The Secretary having read lengthy correspondence which had passed between the Executive and the Agricultural Department, in which the Minister for Agriculture suggested the adoption of "circle" shows, and explained the position to date, the resolutions on the paper were discussed.

Mr. C. A. Pope (Molteno) moved that in the opinion of this Union the "Ring" or zone system of Agricultural Shows will not meet the requirements of the farming community, the present system with necessary alterations being more adapted to this Colony. Mr. P. A. Myburg (Paarl) seconded.

Mr. Pope explained what his Association considered would be the great disadvantages of the proposed Circle Shows, the jealousy which would be engendered between the adjoining centres, and the partiality of farmers to exhibit in their own districts.

Mr. Myburg condemned the proposal, also Mr. Cloete (Molteno), who felt that "circle" shows would crush out the farmers who were content at first to exhibit locally.

Mr. Shaw Nicholson (Paarl) said his Society was in favour of a scheme by which there should be four provincial shows, viz., Northern Province at Kimberley, Eastern at East London, Midland at Port Elizabeth, and Western at Cape Town. The other shows would be limited to the various districts, and in consequence the exhibitor who resided in that show district would have the opportunity of bringing his best forward at the open or provincial shows.

Mr. J. J. McNally (Aliwal North) agreed with Mr. Nicholson, but urged that another province for the immediate Border should be included.

Mr. Rademeyer, M.L.A. (Humansdorp) moved: "That in the opinion of Congress the present system in force should be maintained as serving the best interests for promoting stock farming and agricultural interests in general."

Mr. A. W. Douglass moved: "This Union is of opinion that the time has arrived to grade all shows into classes, in order to obtain a Government grant according to the number of their entries, with two exceptions: (1) a Western Province Show, and (2) an Eastern Province Show, these two to be recognised as the premier shows, and obtain a fixed sum yearly. All other shows shall participate on a sliding scale according to the number of their entries." Mr. P. de Wet (Robertson) seconded.

After further discussion, Mr Douglass withdrew his motion, and on a vote being taken Mr. Pope's motion was adopted by a large majority.

Congress then adjourned till 2 p.m.

AFTERNOON SESSION.

On resuming at two o'clock, it was proposed by Mr. Van der Byl, and seconded by Mr. Pope, that the following subjects be referred to a committee of nine to consider same and bring up a report as soon as possible to this Congress: —

1. Agricultural Shows. —

(*c*) Proposal by Cradock Agricultural Society: "That the question of grants to all Agricultural Societies be limited, as from the educational point of view, nothing is gained by the increased value of awards."

(*d*) Proposals by the Molteno Agricultural Society: "1. That certain Shows be held as Open Shows, to which special regulations shall apply, and that all other Shows be considered and held as District Shows; 2. That the Government be requested to continue the grants as at present, provided that such Societies as claim assistance shall conduct their Shows in accordance with certain regulations as laid down by the Union. 3. That a Committee be appointed by the Union to draw up such regulations for its consideration."

(*e*) Proposal by Cape Flats Farmers' Association: "That Government be asked to grant a prize for the best kept general farm, poultry farm, and dairy farm in districts where Farmers' Associations exist, and open to members of such Associations only."

2. Judging at Shows. —

(*a*) Correspondence with the Agricultural Department on the subject of rail fares of Judges.

(*b*) The Single Judge System.

(*c*) The Appointment of Judges.

(*d*) The need of Judges reporting in greater detail on first and second prize animals.

(*e*) Model prize list.

(*f*) Proposal by East London Agricultural Society: "That classes be added to prize lists for unhoused sheep."

3. Railway Facilities for Agricultural Shows.—Proposal by Aliwal North Agricultural Society: "That in order to encourage Agricultural Shows all railway charges for stock and produce for show purposes be amended; and that railway facilities granted to visitors to Agricultural Shows be made available on all sections of the Cape Government Railways."

4. The Allotment of Show Dates for 1908.—To include the consideration and adoption of such steps as may be calculated to prevent the overlapping and clashing of dates in consequence of original fixtures not being adhered to.

Mr. Theron suggested that the Committee should be five, while another delegate suggested seven.

On the vote being taken, it was resolved that the Committee should consist of nine members.

Lengthy discussion ensued as to the best method of allotting show dates, to prevent overlapping, and it was ultimately resolved to leave matters as they stand. The Committee to consider and report upon the above was nominated as under: Messrs. Shaw Nicholson (Paarl), Faure (Western Province), Hugo (Worcester), Pope (Molteno), Perks (East London), McNally (Aliwal North), Guthrie (Port Elizabeth), Hoole (Grahamstown), and Coetzee (Cradock).

The Eradication of Dodder.

Mr. O. E. G. Evans moved: "That in the opinion of this Congress the immediate attention of the Government should be called to the alarming increase of dodder in lucerne in all parts of the country, and that systematic scientific investigation be forthwith undertaken in the direction of effecting the eradication of this pest." He said the Government in reply to their last letter stated that a Bill was being introduced which would secure the freedom of lucerne seed from dodder. They wanted the cure now. The growth of lucerne was still in its infancy, but it was going ahead by leaps and bounds, and every member would agree that the measure to be brought before Parliament was one of the most important which could be carried through the ensuing session. Meantime, the resolution would do a great deal towards prevention —Mr. De Wet seconded.

Mr. Edmeades said Oudtshoorn was taking strong measures in this regard by means of inspection, and he impressed on representatives in Parliament the great need there was for the immediate passing of legislation.

Mr. B. K. Mayo (Bayville) also pointed out the dangers of dodder, which he considered too few people appreciated

The motion was unanimously agreed to.

Cool Trucks for Produce

The Secretary read the report of a sub-committee of the Executive, showing what steps had been taken to urge the necessity for cool trucks for produce on the Government and Railway Department.

Mr. C. J. Duckitt (Darling) moved: "That the necessity for cooling facilities on the railways for perishables, such as butter, be again urgently represented to the Department."

Mr. J. P. Hannon said the question of cold storage for produce had been under consideration for some considerable time. Various schemes had been suggested, such as putting up ice manufacturing establishments at various points, but that was found to be very expensive. Another scheme was to provide cooling facilities through the use of brine-charged cars, which would be recharged at various fixed points. It was further suggested that groups of farmers might establish abattoirs, where cooling facilities would be obtainable, but that had not met with much success as yet.

Mr. Van der Byl suggested that Mr. Duckitt might add to his resolution "that the attention of Government be drawn to the necessity for the number of fruit trucks being increased, as the cattle trucks used are so badly ventilated that they do not properly serve the purpose."

Mr. Hannon explained that the Department had already the whole matter of these fruit trucks in hand, and it would help the work along if this Congress expressed itself in favour of obtaining an increased number of trucks.

The motion was carried.

RAIL CHARGES ON COLONIAL PRODUCE.

Mr. P. A. Myburg moved: "That Government be requested to bring railway freights on Colonial produce back to the old ½d. per ton per mile rate."

Mr. Rademeyer, M.L.A., said the rate was at present ½d. per ton per mile according to the Convention.

It was resolved that the motion be deferred.

NATURE STUDIES IN SCHOOLS.

Mr. Hannon said this subject had been under the consideration of the Department for some time, and proper text books were being selected for use in the primary and secondary schools. He was satisfied that, without interfering with the ordinary routine, opportunity could be found for this study, and also for teaching agriculture and its methods. He spoke in high terms of the up-to-dateness of Elsenburg College in regard to the latter, and hoped the Congress would take the opportunity of expressing its appreciation of the College's efforts and usefulness.

The President explained, in connection with the subject of Nature Studies, that Professor Duerden, who was on the agenda for a paper, was unable to attend Congress.

The delegates expressed regret.

After further discussion, it was resolved, on the motion of Mr. T. P. Theron, M.L.A.: "That this Congress urges on the Education Department the necessity of encouraging nature studies in all State-aided schools, and, if possible, by regulation."

EXPERIMENT AND TRAINING FARMS.

Mr. O. E. G. Evans moved: "This Congress strongly urges upon all Agricultural Societies the necessity of imparting a clear understanding of the aims and objects of Elsenburg College to the farmers of the Colony."

Mr. Hoole favoured the inauguration of a farm for stock-raising in the Eastern Province, and spoke highly of the work done at Hawkesbury College in Australia, which should be faithfully copied in a similar establishment in this Colony.

The President said this subject was constantly coming up, and he did not think the resolution went far enough. He suggested that a special committee might be appointed to consider the whole question of experiment farms.

Mr. Hannon suggested that they should add to the resolution, in order to meet the suggestion, "that this Congress is in favour of the establishment of an experiment station in the Eastern Province."

Mr. Evans accepted this addition.

Mr. T. P. Theron, M.L.A., moved: "That the attention of Government be directed to the necessity of the training of the rising generation to methods of farming, not only technically, but practically, either by starting, besides Elsenburg, other Agricultural Schools in fit and proper places."

At this stage Congress adjourned till next morning at 9 o'clock.

SECOND DAY (THURSDAY, MAY 16).

Congress resumed at 9 a.m., Mr. C. G. Lee (President) in the chair.

Experiment and Training Farms.

Discussion on the above subject was resumed.

Mr. Theron explained the difficulty of fixing any place, which would bind the Government, and thus give them an opening for shelving the matter. He thought his resolution was clear, and he had in his mind the Eastern Province, but counselled them to leave the place an open question.

Mr. Evans said Mr. Theron admitted another college in the Western Province could not be established, and suggested that he insert words excluding it from the Western Province.

Mr. D. M. Brown moved that they re-affirm the principle of agricultural educational institutions being established by Government.

Mr. Edmeades urged that they should leave the matter to the Government to select the place. He was sorry to see the feeling as between East and West still existed. The sooner they presented a solid front the sooner they would get what they desired.

Mr. Myburg (Western Province) said he thought the feeling between the Provinces was gone, but they could not have another college in the Western Province. Neither could they remove Elsenburg, for they had gone to too great expense there.

Mr. Albertyn urged that they wanted a college adapted for stock-breeding.

Mr. Evans, in replying, said he had no idea of pitting the Eastern Province against the West.

Congress, after discussion, carried Mr. Evans' motion by 20 votes to 17, and Mr. Theron's unanimously, with the following addition: "And that Congress reaffirms the resolution passed at the 1903 Congress."

Lectures on Agricultural Subjects.

The President stated that the Rhodes University professors were arranging public lectures and demonstrations on agricultural subjects by qualified lecturers.

Mr. Douglass moved: "That this Union views with pleasure the forthcoming lectures given by Rhodes University on agricultural subjects, and give them their cordial support and sympathy." Mr. Evans seconded.

Mr. D. M. Brown suggested that the words be added: "And that it urges upon the delegates to place the syllabus of same before their various societies."

Several members of Congress expressed thanks to the professors for what had already been done.

Mr. C. H. Mackay said the Port Elizabeth School Board were availing themselves of the services of the professors to give lectures on literary subjects.

The motion and rider were unanimously agreed to.

The President said it was pleasing to see a subject like this taken up by such a gathering so unanimously, which proves that the country, which had aroused itself, was also waking up to more energetic action on the part of distributing knowledge to the rising generation. This was a very encouraging feature, one of the most encouraging, because they came in competition with countries which were exerting every nerve to develop their rising young farmers, and if they did not do the same they were perfectly sure they would fall very far behind. They were convinced that they had the material amongst their young farmers to produce as good as this world can—if they were given a chance.

PROPOSED AGRICULTURAL CREDIT SYSTEM.

Congress next proceeded to discuss the clauses of the Agricultural Credit system circular *seriatim*.

Mr. Theron said he was not going to take part in the discussion or vote on this subject. He would have an opportunity in another place of doing this.

Mr. Hannon said this was one of the most important matters before the Congress, and proceeded to briefly explain the proposal by which loans would be advanced on certain security by an Agricultural Bank for agricultural improvements. The circumstances were threefold: First, the paying off of existing liabilities in cases where farmers showed that permanent improvements could be made; second, the carrying out of certain improvements in themselves; and third, the purchase of stock and plant. As to the question of security, it must be a first mortgage, or in the case of leasehold property, such security as Government shall approve. When the scheme came up the point would arise as to whether it was comprehensive enough to meet all cases. In the course of various criticisms on the proposal, it had been urged that it would help the rich instead of the poor farmer. He did not agree that it would. The pivot was the extent to which security could be accepted. It must not be less than £50, and not more than £5,000. Congress could consider whether these were correct limits. Then the interest was fixed at 5 per cent., or when the interest was paid within fourteen days after the due date, 4½ per cent. Then there were the times of repayment to be discussed, while as to the total amount of the loan Parliament would fix the amount. Management and control could meantime be left on one side, but they could decide whether the scheme was sound in principle, whether the suggested purposes for the advancing loans are sufficient, and also the matter of interest.

The first clause was unanimously adopted as follows:—

> It is suggested, in the first place, that it will be to the advantage of Cape Colony to adopt the principle of giving loans to individual farmers and co-operative associations of farmers upon such terms as shall stimulate agricultural and pastoral industry.

The second clause was as follows:—

> It is suggested that the loans should be granted for the following purposes:
>
> (*a*) To pay off existing liabilities in cases where the Board approves of the proposed improvements.
>
> (*b*) To effect improvements, including:
> - (1) Water storing and leading.
> - (2) Fencing.
> - (3) Clearing land for agriculture.
> - (4) Planting of orchards and vineyards.
> - (5) Farm buildings.
>
> (*c*) Purchase of stock and plant.

Mr. Myburgh moved, with regard to (*a*), that loans be on fixed property only.

Mr. Fichat asked if the Government's intention was to restrict loans to farmers only who were making improvements. He moved that the words should be added "where the Board approves of proposed improvements."

Mr. Hannon suggested that this would amount to converting the Government into a banking institution. The main principal of the whole proposition was to assist the farmer to improve his farm, thereby encouraging the development of the resources of the country.

The amendment was lost.

On section (*b*),

Mr. Myburgh moved that this be deleted.

Mr. Douglass seconded.

Mr. Hannon urged that as the result of such an amendment the farmer who wanted to build a dam, erect a fence, or effect other improvements would be compelled to sit on his haunches because it was not fit for the State to advance money to increase its own wealth. He could not understand such an argument.

Mr. Cloete could not agree with Mr. Myburgh. The clause was far reaching, and, probably, if opposition only meant lopping off some of the branches, it would have more support. Meantime he moved the adoption of section (*b*) as it was printed.

Mr. Douglass said the moment they passed this clause they laid open the whole of the Act. They could get money from any bank on landed property. They might have to pay 6 per cent. for it. He considered all the purposes mentioned were already provided for. Water storing and leading were dealt with under the Irrigation Act, while, with regard to fencing, they could always get plenty of poles and wire. As to clearing the land, well, say a man had a hundred acres, he would get a loan towards clearing it, and would clear one acre and devote the remainder of the money to something else. Again, as to planting vines, a certain amount of work might be done, and the following year might find all the vines dead. Where then would the Government's security come in? As to farm buildings, these were of very little value indeed, and provided no security.

Mr. Albertyn (Bredasdorp) remarked that Government would certainly not advance money without good security They would not give more than the actual value of the farm. He, therefore, could not understand Mr. Douglass' remarks.

Mr. Fitchat asked if Government would make further advances than simply sufficient for wiping off previous liabilities. If not, the loan would be of very little benefit to the farmer. He was of opinion that Government had something up its sleeve in this respect, and would give more than the actual liabilities.

Mr. Krige said he could not understand Mr. Douglass. If Congress adopted his attitude they might as well throw the whole thing away.

Mr. Smit agreed that Government would take care as to the security.

In reply to Mr. Geard,

Mr. Hannon said money would only be advanced when it was invested in the improvement it was asked for. There would be a system of supervision and a certificate would be required that the work was done.

Mr. Gerber asked if an advance would be made to enable a farmer to put up a very fine residential property on his farm, so that he might outvie his neighbours.

Mr. Hannon said the advance of money for building would be subject to the judgment of the Board.

Mr. O. E. G. Evans said he heartily approved of the clause, and expressed the opinion that Mr. Douglass was quite mistaken in his reading of the scheme. He proposed to add to (3) "clearing and (or) reclaiming land," while as to farm buildings, he suggested that these should be under such limitations as might be imposed by the Board.

Mr. Myburgh confessed that he could not see how Government was going to get its money back. They knew what comprised Government inspection; it was of the most haphazard style. It was the last thing they should expect from Government, money for the erection of farm buildings.

Clause (*b*) was carried with the amendments suggested by Mr. Evans.

3. It is suggested that the security in each case shall be a first

mortgage upon the land, or in the case of leasehold property, such security as the Board shall think fit. In each case the Board shall make an independent valuation of the land, and the advance shall in no case exceed two-thirds of the total value of the land, with the improvements, etc., for which the advance is sought. The Board to have absolute power to accept or refuse any application.

Mr. Krige moved and Mr. Cloete seconded the adoption of this clause, which was carried without discussion.

4. It is suggested that loans should not be granted for a sum less than £50, nor for a larger sum than £5,000, without the special consent of both Houses of Parliament, the object being to encourage the working farmer of small means, rather than the larger landowner, and to stimulate the closer settlement of the land.

Mr. Malleson moved and Mr. De Wet seconded the adoption.

Mr. Krige thought the amount should not be limited, and moved that it should be granted in accordance with the value of the property.

Mr. Myburgh suggested that this was unnecessary, as, for amounts over £5,000, the applications would go before Parliament.

Mr. Hannon said the primary object of the Government was to help the poorer farmers, and urged that Congress should not introduce anything into the scheme which might endanger it when it came before the House.

Mr. Krige withdrew his amendment, and the clause was adopted.

5. It is suggested that the interest charged shall be 5 per cent., or, if paid within fourteen days of the due date, to be 4½ per cent., a rate that should cover the actual interest to be paid as well as the working office expenses. In addition to the interest, the borrower should pay the actual cost of the loan, expenses of valuation, etc. Beyond this there should be no charge for preparing the bonds, beyond the cost of registration, unless special legal expenses have to be incurred. The mortgage bonds also should be free from stamp duty.

Mr. Cloete asked whether 4½ per cent. would be the lowest charged by Government.

Mr. Hannon: Yes.

Mr. Geard moved the adoption of the clause, Mr. De Villiers seconding.

Mr. Gerber thought that the interest charged will be the lowest rate based on the rate on which the Government loan was raised.

Mr. Hannon reckoned that Congress was suggesting something which could not be carried out in actual procedure.

Mr. Douglass said there was no clause which provided that if the interest was not paid, the Board would have the power to foreclose.

Mr. Hannon said this was not the draft of the Bill. It was simply a summary of the suggestions leading up to the Bill. No one would give a loan without a penalty clause.

Mr. Crosby seconded Mr. Gerber's amendment, stating that they were only suggesting that Government might take into consideration the state of the money market.

Mr. Van der Byl thought they ought to give Government credit for the fact that they had advisers of considerable business capacity.

The amendment was lost, and the clause adopted as printed.

6. The terms of repayment should vary with the nature of the loan; but in no case should they be extended beyond forty years.

In reply to Mr. Krige,

Mr. Hannon stated that the number of years over which the loan will extend will be fixed by Parliament.

Mr. Krige suggested that under the sinking fund principle a loan could be wiped out in 40 years.

Mr. Brown did not think that the ordinary actuarial system should commence till two or three years after the loan is granted.

Mr. Hannon said the sinking fund would only be introduced when the money had been invested. They could pay off the loan when they could.

In answer to Mr. Caten,

Mr. Hannon said the option was to give to the borrower to redeem the loan at any term of years he liked. It was a redeemable sinking fund.

Clause 6 was passed as printed.

7. It is suggested that in the first place the amount authorised to be raised should not exceed one million sterling.

This clause was not discussed.

8. With regard to the management and control, it is suggested that the soundest method is that of creating an Agricultural State Bank, controlled by Boards nominated by the Government, with the approval of Parliament, and governed by regulations which have received Parliamentary sanction. If a system of agricultural loans were directly under the control of Government, it would be almost impossible to dissociate it from political influence, and certainly it would be hampered in its work by the suggestion of political influence The Board, when appointed, shall have full statutory powers to accept or refuse any proposal, without interference from the Government of the day, and the members of the Board should, after appointment, only be removed from office by a direct vote of both Houses of Parliament. The Board, too, should take control of all loans and advances made in this Colony under the various Acts of Parliament, and from the date of its appointment all loans granted should be under the terms of the Act.

Mr. Krige favoured the appointment of local Boards as well, the same to be at no expense to the Government.

The President thought they should affirm the principle that a Board is necessary They might go that far, but should not go into details.

Mr. Van der Byl moved, as an amendment, "one or more Boards," and this was agreed to.

Mr. D. M. Brown then moved: "That this Union adopts the various resolutions and amendments passed at this Congress on the proposed Agricultural Credit System for Cape Colony, but before finally adopting, urges upon Parliament to appoint a Special Commission, consisting of Members of Parliament and others, to take evidence and report on the practicability and utility of the whole scheme."

Mr. O. E. G. Evans seconded, and the motion was agreed to.

Agricultural Statistics.

Mr. D. M. Brown moved: "That in the opinion of this Congress it is eminently desirable that the Government shall arrange for the collection of reliable agricultural statistics with reference to each branch of farming in this Colony; and that a report dealing with such returns should be published annually by the Agricultural Department." Mr. Malleson seconded, and the motion was adopted.

Fruit Growers' Congress.

The President of the Fruit Growers' Congress at King William's Town wired: "Congress decided to meet next year at Kimberley, on same date as Farmers' Central Congress. Trust you will be able to do the same."

Locust Destruction.

Mr. Cloete moved "that the time was not ripe for a scheme of compulsory destruction of locusts."

Mr. Krige thought they should leave the matter to Government to find out the best method of dealing with the pest, and if they could co-operate with other States, their hands would be strengthened.

Mr. Struben moved "that in the opinion of this Congress the Government should take concerted action with the other Governments of South Africa in the destruction of locusts."

Mr. Hannon said what the Government would like was an idea as to what way they might co-operate with the other States.

Mr. Theron said this was a hardy annual in Parliament, and they had not yet found a remedy. No matter what was tried the pests reappeared at intervals. There was an annual vote of £1,000 towards destruction, and Government had found that even grants to farmers for doing the work did not work satisfactorily. They had offered every inducement and had failed. The great difficulty was the great extent of waste land which they could not supervise.

Mr. Evans moved: "That this Congress approves of the principle of concerted action being taken as to the best and most advisable methods of treating with the locust plague, and that this be a subject for the Inter-Colonial Congress."

This was agreed to.

The President mentioned that they had to elect delegates to the Inter-Colonial Conference, and he thought they might go there with free hands on this subject It would be a most important Conference.

Mr. T. W. King (Bedford) explained a scheme of co-operation which had been adopted in his district, by which they had saved their crops. He moved · "That Congress desires to express its appreciation of the liberal assistance which has hitherto been given to farmers who have co-operated for the destruction of locusts, and urges upon the Government the desirability of continuing that assistance when any co-operative movement is carried out among groups of farmers for the destruction of locusts or their eggs, in their area." Mr. Evans seconded, and the motion was carried.

Mr. Struben moved and it was adopted: "That delegates of this Congress to the forthcoming Inter-Colonial Union Congress be instructed to propose the formation of an Inter-Colonial Locust Destruction Board, to administer an Inter-Colonial Locust Destruction Fund." Mr. B. K. Mayo seconded.

Contagious Diseases.—Inter-Colonial Regulations.

It was resolved, on the motion of Mr. D. M. Brown, "That the delegates to the Inter-Colonial Congress have full powers to deal with the question of Inter-Colonial Contagious Diseases (Animals) Regulations."

Registration of Brands.

With regard to the registration of brands on cattle and ostriches, the Congress resolved to re-affirm previous resolutions passed on the subject.

Inspection of Stud Stock.

Mr. D. M. Brown moved: "That the Darling Agricultural Society be requested to prepare a scheme whereby effect could be given to its suggestion as to the necessity for Government inspection and approval of stud stock."

Mr. Albertyn moved, on behalf of Bredasdorp Agricultural Society: "That no horses or donkeys should be allowed to remain entire after the age of two years unless inspected and approved by a Commission consisting of one Government official and two local agriculturists of the district from which such animals are submitted for inspection." Mr. De Wet seconded.

Mr. Cloete was of opinion that the best way, outside of putting more expenditure on Government, was to leave it to the various districts to improve the standard of the local stock themselves.

Mr. Brown moved an amendment that the words after "approved and passed" be deleted.

Mr. Myburgh said there must be a Commission to deal with the proposal.

Mr. Hannon thought they ought to be practical above all things. It would be better to refer this subject to the Executive, to devise with Government the best methods possible of dealing with this subject.

Mr. Struben moved "that the subject be referred to the Executive."

Mr. Guthrie thought a very substantial licence should be levied on the entire horse and donkey. That was the way to improve the stock. He made that suggestion to the Executive

Mr. Berry suggested that in dealing with this matter the conditions in the Native Territories should be considered.

Mr. Theron moved an amendment that rams and bulls be added to the resolution.

Mr. Albertyn agreed to this, and Mr. Myburgh suggested the age of rams at six months and bulls at one year.

Mr. Struben's amendment was adopted.

S.A. Stud Book.

The subject of S.A. Stud Book—Protection of Mark and Common Seal in Cape Colony, was taken up.

It was resolved that the matter be referred to the Executive to prepare a short Act to protect the brands

Exportation of Ostriches.

Mr. Evans moved and Mr. Cloete seconded, and the following resolution was adopted: "That this Congress urges upon Government the necessity of prohibiting the exportation of ostriches and ostrich eggs from this Colony, and that the Government endeavour to obtain the co-operation of neighbouring Colonies."

Congress adjourned at 1.20 for luncheon at the P.E. Club, by invitation of the President of the P.E. Agricultural Society.

AFTERNOON SITTING

Presentation to Mr. D. M. Brown.

On re-assembling, the President said a very pleasing duty fell to his lot, and that was to present Mr. D. M. Brown with a small recognition of his work for the Union. They would all remember that for about thirteen years, Mr. Brown acted as hon. secretary to the Union, and at times when things were slack and there was no possibility of holding a meeting, Mr. Brown kept the Union going, so that when they were

ready to start again the machinery was there and only had to be set in motion. They all knew what a lot of work fell on the shoulders of anybody who had to undertake the position of secretary to a society such as theirs. He felt sure that the Union appreciated very much the services Mr. Brown had so long rendered, and it was only a small token which he had the pleasure to hand Mr. Brown in the shape of a gold watch.

Mr. Brown feelingly acknowledged the gift. To say that he was taken aback was, he remarked, to express mildly what his feelings were. He could assure them that he never expected any such recognition as that, but it was some satisfaction to think that his fourteen years' services had been appreciated, and he would hand down to his family that tangible gift which he had received at their hands. The speaker gave some interesting details of those who had been connected with the Union, and who had passed away, and said he was pleased to see that their sons took the same interest in the Union that their fathers did.

Agricultural Show Matters.—Committee's Report.

The Chairman of the Committee appointed to consider the questions affecting agricultural shows (Mr. T. T. Hoole) submitted the report, which, after some discussion, was adopted as under:—

The Committee assembled in the Committee-room, there being present Messrs. T. T. Hoole, chairman, T. Shaw Nicholson, J. C. Faure, D. M. Hugo, C. A. Pope, C. P. Perks, J. J. MacNally, P. J. J. Coetzee, and A. Guthrie, with the Secretary, Mr. F. D. MacDermott.

With reference to

Proposal by Cradock Agricultural Society: "That the question of grants to all Agricultural Societies be limited, as from the educational point of view nothing is gained by the increased value of awards."

Proposals by the Molteno Agricultural Society: "1. That certain shows be held as open shows, to which special regulations shall apply, and that all other shows be considered and held as district shows. 2. That the Government be requested to continue the grants as at present, provided that such Societies as claim assistance shall conduct their shows in accordance with certain regulations as laid down by the Union. 3. That a committee be appointed by the Union to draw up such regulations for its consideration."

Proposal by Cape Flats Farmers' Association: "That Government be asked to grant a prize for the best kept general farm, poultry farm, and dairy farm in districts where Farmers' Associations exist, and open to members of such Associations only."

The Committee recommends,

That the proposal of the Cradock Agricultural Society be not at present entertained. (*d*) With regard to the proposals by the Molteno Agricultural Society, the Committee recommends that the Government be requested to continue the grants as heretofore, provided that every Society holding a show and claiming a grant in aid, shall give notice not later than May 31st in each year, supported by an estimate of the probable total amount of the prize list, such claims to have preference in the distribution of the funds provided by Parliament.

With regard to Section 2, sub-sections (*a*) and (*b*),

(*a*) Correspondence with the Agricultural Department on the subject of rail fares of Judges.

(*b*) The single Judge system,

Your Committee recommends that to meet the question raised in the correspondence, the Union advises the adoption of the single judge system where possible, and that secretaries of societies be requested to estimate each year, the probable number of judges likely to have to be provided for.

With regard to sub-section (*c*) (appointment of Judges), your Committe recommends that the secretary of the Union compile and circulate lists of judges among the Agricultural Societies, requesting each to make suitable additions, if any, same to be returned to the Secretary, who shall, upon receipt of such complete lists, furnish each Agricultural Society with a printed copy thereof.

With regard to sub-section (*d*) (need of Judges reporting in greater detail on first and second prize animals), your Committee recommends that this Union should urge upon all Agricultural Societies the imperative necessity of judges reporting in greater detail on first and second prize exhibits, and the publication of such reports.

With regard to sub-section (e) (model prize list), your Committee cannot see its way to recommending a model prize list, as the conditions of the different districts vary so much. Your Committee, however, would recommend the necessity for the reduction of the larger amounts at present awarded by the more important societies, as the original object, namely, the encouragement of the importation of high class stock has now been attained.

With regard to sub-section (f) (the proposal of East London Agricultural Society "that classes be added to the prize lists for unhoused sheep"), your Committee recommends that this proposal be adopted, and that Angora goats be included.

With regard to Section 3 (proposal by Aliwal North Agricultural Society: "That, in order to encourage Agricultural Shows, all railway charges for stock and produce for show purposes be amended; and that railway facilities granted to visitors to Agricultural Shows be made available on all sections of the Cape Government Railways," your Committee, after inquiring, find the difficulty will be met by the Union recommending that the same rail facilities should be extended to visitors to Agricultural Shows over all the Cape Government Railway lines.

In conclusion, your Committee deem it advisable to recommend further that every mutual effort should be made to obviate the clashing or overlapping of Show dates, and with this object in view, would suggest that all Agricultural Societies submit their dates to the Secretary for approval and mutual arrangement, and that each Society also undertakes to abide by the agreed dates, once they are fixed.

Wells in the North-west.

Mr. T. P. Theron moved a resolution from Britstown Agricultural Society as follows. "That Government should be urged to subsidise the sinking of wells in the North-Western Districts of the Colony in the same manner as subsidies are granted for the sinking of bore-holes." He mentioned the great difficulty experienced in these parts of the country which led his Society to advance the resolution.

Mr. Evans seconded, and the motion was agreed to.

Congress then adjourned till the evening.

EVENING SITTING.

Election of Officers.

On re-assembling at 8 p.m., the Congress proceeded to the election of officers.

Mr. C. G. Lee was unanimously re-elected President, and the Hon. P.

Mr. C. G. Lee was unanimously elected President, and the Hon. P. W. Michau, M.L.C., and J. Rawbone, Vice-Presidents.

The names of Hon. Dr. Smartt, Hon. A. Fuller, Mr. D. M. Brown, and Mr. P. Ryan (of Cape Town) were added to the list of hon. Vice-Presidents.

The Executive Committee was elected as follows:—Messrs. F. C. Bayly, Britstown; John Daverin, Port Elizabeth; O. E. G. Evans, Bedford; J. G. Sieberhagen, M.L.A., Richmond; the Hon. W. Rogers, M.L.C., Cathcart; W. van der Byl, Stellenbosch; E. M. Warren, Stutterheim; T. P. Theron, M.L.A., Britstown; E. T. L. Edmeades, Oudtshoorn; P. R. Malleson, Hex River; R. H. Struben, Tafelberg; D. M. Hugo, Worcester; T. T. Hoole, Atherstone; D. J. Albertyn, Bredasdorp; and A. W. Douglass, Fort Beaufort.

Inter-Colonial Congress.

The following were nominated as delegates to the Inter-State Congress to be held at Pretoria towards the end of August:—Messrs. T. P. Theron, M.L.A., D. M. Brown, O. E. G. Evans, A. W. Douglass, W. van der Byl, T. T. Hoole, E. T. Edmeades, R. H. Struben, S. F. Cloete, C. A.

Pope, D. M. Hugo, J. C. Faure, H. Collett, E. J. Geard, J. Daverin, J. Rawbone, P. W. Michau, M.L.C., Coetzee, W. A. Krige, J. Mitchell, Kubusie; W. A. Edmonds, Kei Mouth; and three members of the Fruit Growers' Congress, should that body accept.

The Executive has the power to elect substitutes for those nominated.

The Secretary stated that any member could go to Pretoria, attend and speak at the Congress, but each Colony had only ten votes. They were entitled to the railway privileges.

The President said they could nominate more than their voting delegates. All the other centres did so.

Mr. Brown agreed with the President; they should nominate as many as possible, and the delegates arrange amongst themselves who should vote. He moved: "That the Executive urge upon the Government to send as many experts as possible to the Inter-Colonial Conference." Agreed to.

It was stated that the Conference would take place towards the end of August.

In response to Mr. van der Byl, the Secretary stated that the Central Farmers' Association had not accepted the Union's invitation to participate in the Inter-State Conference.

The Country's Progress.

Mr. T. P. Theron, M.L.A., at this stage, said he had to depart, and he desired to express his high appreciation of the manner in which the business had progressed. It had been most pleasurable to him. Concluding, he hoped that they would still further improve their rules of debate. He had made new friends here, and he hoped that by their operations they would be able to go about in good fellowship for the good of the Colony they were all interested in. It had been stated that the farmer was too dependent. What he wanted them to cultivate was the spirit of self-reliance and independence. It was all the Government now-a-days. They must think that the Government was themselves, that the Ministry was simply those whom the people, the taxpayers, chose to represent them. They, the people, had been too long satisfied with the position of carriers—always carriers. They built the lines to Bloemfontein, almost to Pretoria, they thought the wealth of the districts opened up would be theirs, but it had not so happened. They had to turn back to the real backbone of the country—the farmers, the real wealth of the Colony. They had got used lately to look over each other, and look only to the Government; therefore, he wanted them to get right up to the cultivation of the spirit of self-reliance and they would soon find that prosperity would be restored to their beloved country. All the possibilities for progress were to their hand, let them accept them. (Cheers.)

South African Laboratory.

The President introduced the subject of the necessity for the establishment of a Central Laboratory for the whole of South Africa, for carrying out investigations in connection with the diseases of animals and plants.

This was referred for favourable consideration to the Inter-Colonial Congress.

Increased Scientific Staff.

Congress proceeded to deal with proposals to increase the scientific staff of the Agricultural Department: (*a*) By the appointment of more Veterinary Surgeons in the country districts.

This clause was strongly favoured, but there was the query as to where the money was to come from.

Mr. Malleson thought if a small fee was charged by veterinary surgeons for all occasions on which they were called beyond contagious diseases it would make it worth while to have sufficient veterinary surgeons.

Mr. D. M. Brown thought it might be possible for Divisional Councils to pay one-half of the cost of veterinary surgeons, either one or two, as required, and rely on Government for the other half.

The motion, without amendments, was adopted.

Field Botanist and Mycologist.

Congress proceeded to discuss the proposed appointment of a Field Botanist and also of a Mycologist and Plant Pathologist for the study of fungoid and other diseases in plants.

On the latter suggestion,

Mr. Malleson (on behalf of the Western Province Agricultural Society), said that such an expert should be appointed, the remaining part of the resolution on the paper being ruled out of order.

Mr. Edmeades thought some arrangement might be made to secure the services of officials in another State; there might be an interchange.

Mr. Brown moved, as an amendment, that an endeavour should be made to secure the services of a Mycologist for the Colony, alone, or in conjunction with one or other of the various States

After discussion, this was carried

Wire-worm in Ostriches.

Mr. Edmeades moved. "That an officer of the Department be deputed to study the life history of the pest of wire-worm in ostriches."

Mr. Allan seconded, and the resolution was adopted, Mr. Hannon remarking that there were men in the Department who could deal with it.

Congress was discussing the question of noxious weeds, when the session was adjourned until 9 o'clock the next day.

THIRD DAY, FRIDAY, MAY 17

Congress resumed at 9 a m. on Friday. Mr. C. G. Lee (the President) in the chair.

Noxious Weeds.

Mr. Van der Byl moved, and it was resolved, after considerable discussion: "That the spread of various new species of noxious weeds renders urgently necessary the careful enquiry in every district of the Colony into the presence of all such plants and the promulgation of remedies to prevent their further extension. Further, that the Government be requested, in face of the apparent insufficiency of existing laws, to introduce legislation more calculated to cope with this evil."

Rewards for Jackals.

Mr. Albertyn moved: "That Government be requested to renew the system of rewards for the destruction of noxious wild animals so soon as the finances admit, and that every other means for the destruction of carnivorous animals be encouraged by the Government, such as Jackal-proof fencing, etc,, etc." This was carried after some discussion.

UNIFICATION.

The report of the Executive was taken as read, regarding the negotiations which had been conducted for the establishment of a basis of unity of action with the Central Farmers' Association and the Vine and Fruit Growers' Congresses.

Mr. Shaw Nicholson urged that the Executive should take further action towards bringing about the unity of these bodies.

The Secretary said the negotiations were still continuing. It was proposed to hold the Congresses of Fruit Growers and Central Farmers at Kimberley next year, and this Union had been asked to endeavour to meet at same time and place. This, he thought, shewed that Mr. Köhler, who had formulated a scheme of union, was endeavouring to get all the bodies together to consider same.

The President said the thanks of the Union were due to Mr. Köhler and the Western Province Horticultural Board for their efforts towards union.

It was unanimously resolved that the Union approve of having one central body, and requesting the Executive to renew its efforts in that direction during the ensuing year.

THE VITICULTURAL INDUSTRY.

Mr. Van der Byl moved: "In view of the enormous importance of viticulture to a considerable area and to a very large proportion of the population of the Colony, this Congress submits to the consideration of Government that the time has come when the development of this great national industry should receive sympathetic treatment on the part of the legislature. Congress recognises that at present the production of wine exceeds 50,000 leaguers, and of brandy 13,000 leaguers, representing in value £382,000 without excise, and that Government has £170,000 of public money invested in the industry with a view to its extension. Further, that the property value concerned with the viticultural industries exceeds two and a half millions sterling. Congress therefore submits that in view of these facts, the existing restrictions deserve careful revision, with the object of extending the consumption of light Colonial wines under due limitations and control, as against imported liquors and many of the injurious spirituous compounds at present being secretly manufactured and consumed in the country."

Mr. Cloete mentioned the difficulties which the farmers had in connection with intoxicants and their use, amongst the native labourers.

Mr. Struben maintained they could not keep liquor away from the native. Therefore it would be much better to let them have these light unfortified wines rather than the maddening spirituous liquors. He supported the motion.

Mr. Krige spoke as to the present depressed state of the wine industry and urged that it should receive the fullest consideration and assistance.

Mr. Douglass favoured the resolution, and urged that the native should have wine instead of "that confounded Kafir beer."

Mr. Mayo said the Western wine farmers should put a little more energy into their business, and make their products better known in the Eastern Province than they are.

Mr. Evans could not support the proposal. Since the Innes Act had come into force, the life of the Eastern Province farmer was fifty per cent. better, and their farms had greatly improved. That being so, he would not favour any interference with the present law.

Mr. Struben said if this resolution had been for the further dissemination of spirituous liquors they would have voted against it to a man, but these light wines were practically harmless.

After prolonged discussion, in which nearly all the Western delegates took part,

Mr. Geard moved that the Union should postpone the decision on this resolution till next Congress.

Mr. Evans seconded. The passing of such a resolution would affect millions of natives, and he enjoined the greatest caution.

Mr. Nicholson remarked that a similar resolution was postponed last session.

After further discussion, Mr. Van der Byl's motion was adopted.

Vine Mildew.—Plasmopara Viticola.

Mr. Myburgh moved that the Government be urged to continue to take all steps that may be necessary to prevent the spread of vine mildew in the Colony.

Mr. Van der Byl seconded, and the motion was adopted.

Duty on Fruit Packing Material.

Mr. Van der Byl moved: "That the Government be urgently requested to take the earliest opportunity that offers to secure the removal of the duty on wood for fruit boxes imported into this country and packing material." The motion was agreed to.

Barren Stock at Shows.

Mr. Struben moved that in the opinion of this Union it is undesirable and inexpedient that barren female stock be awarded prizes at agricultural shows in classes for breeding stock, and that the Executive Committee be instructed to take evidence and draw up regulations to carry this regulation into effect, sub-regulations to be submitted to next Congress for approval.

This was adopted.

Agricultural Journal

Mr. Myburgh moved: "That a protest be entered against the recent alteration in the regulations governing the distribution of the *Agricultural Journal*, whereby members of Agricultural Societies are no longer entitled to copies gratis unless they are bona fide farmers."

The motion was agreed to.

A motion from Cape Flats was moved that delegates to Conference be found free accommodation. There was no seconder.

Judges of Lucerne.

Mr. Mayo moved that it is desirable that the judges of the lucerne hay exhibits at large shows such as Port Elizabeth, should be selected from large growers or consumers. This was adopted.

Codlin Moth.

Mr. Mayo further moved that steps should be taken to prevent the spreading of codlin moth in the Eastern Province by prohibiting the im-

portation of diseased fruit from the Western Province or any other area. This was defeated.

STANDARDISING LUCERNE.

It was moved that an effort should be made to formulate some scheme for standardising the quality of lucerne hay for market purposes, that is to say, that a certain standard or grade should be agreed upon mutually, between growers, traders and consumers, which would be recognised as first quality lucerne hay. Agreed.

ABATTOIRS.

Mr. Evans moved that this Congress deems it necessary that public abattoirs in certain parts of the Colony should be established on the co-operative principle, and that representations be made to Government to prepare a scheme with the aid of its experts for this purpose.

Mr. Cloete seconded, and the motion was adopted.

HOME INDUSTRIES.

Mr. Van der Byl moved: This Congress recommends to the consideration of the Government and the Agricultural Societies of the Colony, the advisability of making provision for the inclusion of Home Industries in the programmes of Agricultural Shows; and urges that Agricultural Societies should encourage in every way possible the spread of such Home Industries. That the Executive of this Union confer with the Executive of the South African Women's Industrial Union with reference to the limits to be imposed on the introduction of Home Industries into the prize lists of Agricultural Shows. This was agreed to.

THE UNION'S AUTHORITY.

Mr. Struben moved that in the opinion of Congress the status and authority of the Agricultural Union of Cape Colony over the individual Agricultural Societies forming the Union should be clearly defined and strengthened, to which end the Executive shall frame a scheme and lay it before next Congress including incorporation.

NEXT CONGRESS.

It was resolved that next Congress be held in Cape Town at a date to be fixed by the Executive.

The President explained that if it was at all possible to have decided to hold the Congress at Kimberley, they would have done so, but they saw no possibility at present.

THE HON. SECRETARY.

The President moved that it be remitted to the Executive to consider the matter of a bonus to the Hon. Secretary.

Votes of Thanks.

The President, in closing the Congress, expressed his great pleasure at meeting such an assembly, the deliberations of which deserved to be richly and speedily rewarded. He moved hearty votes of thanks to the Port Elizabeth Town Council, Port Elizabeth Agricultural Society, the P.E. Tramway Company, and the P.E. Club. They had received from these bodies such kindness and hospitality that they would all carry away very pleasant recollections of their visit, and indeed most of them when they desired to express hospitality briefly would simply say: "Port Elizabeth." The Union had received great kindness in all the towns where Congresses had been held. It was most encouraging, and the results communicated to their various centres would tend greatly to advance the work they had undertaken.

The votes were heartily accorded, the members standing.

On the motion of Mr. Krige, a hearty vote of thanks was accorded to the President for the tactful and courteous manner in which he had controlled the deliberations of Congress, and the tenth annual Conference of the Union was terminated about one o'clock.

FINAL RESULT OF THE WESTERN PROVINCE AGRICULTURAL SOCIETY'S EGG LAYING COMPETITION.

(Commenced 18th June, 1906, finished 17th June, 1907.)

Pen No.	Breed.	Owner.	Hen No	Total Eggs.	Points.	Weight—ozs.	Totals per Pen. Eggs	Points	Weight ozs.
1	Buff Orpington ..	H. Chas. Starke. ..	1	4	8	$7\frac{3}{4}$	(died	25.6.06	).
		Mowbray.	2	135	270	$285\frac{15}{16}$			
			3	98	162	$176\frac{3}{16}$			
			4	142	284	$295\frac{3}{8}$	379	724	$764\frac{7}{8}$
2	Partridge Wyandottes	J. J. Chenoweth, ..	5	69	102	$124\frac{3}{16}$			
		Durbanville.	6	99	156	$178\frac{5}{8}$			
			7	93	178	$177\frac{11}{16}$			
			8	87	149	158	348	585	$638\frac{1}{2}$
3	White Wyandottes ..	C. W. Mercier, ..	9	156	303	$297\frac{7}{8}$			
		Pillans Road,	10	166	332	$342\frac{13}{16}$			
		Rosebank	11	211	415	$415\frac{11}{16}$			
			12	142	252	$268\frac{1}{8}$	675	1302	$1324\frac{1}{2}$
4	White Leghorns ..	S. Smith, Talana, ..	13	127	244	$237\frac{1}{8}$			
		Wellington Avenue,	14	171	217	$295\frac{7}{16}$			
		Wynberg.	15	116	225	221			
			16	223	397	$409\frac{7}{8}$	637	1083	$1163\frac{7}{16}$
5	White Wyandottes .	J. Leibbrandt ..	17	154	305	$371\frac{1}{4}$			
		Rondebosch.	18	88	171	$170\frac{11}{16}$	(died	31.5.07	).
			19	123	243	$266\frac{1}{8}$			
			20	116	160	$204\frac{9}{16}$	481	879	$1012\frac{5}{8}$
6	Buff Orpingtons ..	H. Davidge Pitts, ..	21	133	266	$298\frac{11}{16}$			
		Rondebosch.	22	10	20	$21\frac{1}{4}$	(died	2.7.06)	.
			23	129	253	$255\frac{3}{8}$			
			24	155	308	$314\frac{7}{8}$	427	847	$890\frac{11}{16}$
7	Plymouth Rocks ..	S. Smith, Wynberg..	25	157	261	$287\frac{1}{4}$			
			26	104	126	$172\frac{11}{16}$			
			27	137	262	$259\frac{3}{4}$			
			28	167	266	$298\frac{5}{8}$	(died	24.5.07	).
							565	915	$1017\frac{13}{16}$
8	Buff Orpingtons ..	F. H. Cooper, ..	29	145	250	$273\frac{1}{4}$			
		Stellenbosch.	30	96	168	$177\frac{7}{8}$			
			31	122	243	$249\frac{7}{16}$			
			32	101	196	$197\frac{13}{16}$	464	866	$898\frac{3}{8}$
9	Brown Leghorns ..	C. Soderlund, ..	33	137	271	$282\frac{9}{16}$			
		Bellville.	34	1	2	$1\frac{15}{16}$	(died	23.7.06	).
			35	146	292	$291\frac{9}{16}$			
			36	169	310	$311\frac{1}{4}$	453	875	$887\frac{13}{16}$
10	Buff Orpingtons ..	F. P. Kirkland,	37	153	302	$334\frac{1}{4}$			
		Premier Poultry Yards	38	154	304	$318\frac{1}{8}$			
		Rietfontein, Pretoria	39	117	215	$219\frac{3}{4}$			
			40	146	276	$280\frac{7}{8}$	570	1097	1153
11	White Leghorns ..	R. Archibald, ..	41	93	184	$179\frac{7}{8}$			
		South Avenue,	42	88	176	$174\frac{13}{16}$			
		Kenilworth,	43	140	266	263			
		Kimberley.	44	114	225	$228\frac{3}{4}$	435	851	$846\frac{7}{16}$
12	Buff Leghorns ..	F. W. Strangman, ..	45	89	148	$160\frac{1}{2}$	(died	30.11.9	6).
		Erin Vale,	46	182	358	$355\frac{11}{16}$			
		Somerset West.	47	115	217	$215\frac{5}{8}$			
			48	5	8	$9\frac{1}{4}$	(died	12.8.06	).
							391	721	$741\frac{1}{16}$
13	Buff Orpingtons ..	A. C. Buller, ..	49	75	146	$142\frac{3}{8}$	(died	3.11.06	).
		Dwarsriviershoek,	50	136	267	269			
		Stellenbosch.	51	131	258	$263\frac{7}{8}$			
			52	147	272	$274\frac{5}{8}$	489	942	950
14	Buff Orpingtons ..	Sergt. Donald, ..	53	136	256	$256\frac{7}{16}$			
		Rondebosch.	54	179	302	$330\frac{13}{16}$			
			55	92	179	$179\frac{13}{16}$			
			56	117	228	$224\frac{5}{16}$	524	965	$991\frac{6}{16}$
15	White Wyandottes ..	J. P. Beldon, ..	57	139	185	$240\frac{9}{16}$			
		New Church St.,	58	128	246	$263\frac{1}{16}$			
		Cape Town	59	95	184	$183\frac{9}{16}$			
			60	27	30	44	(died	25.1.07	).
							384	645	$731\frac{3}{16}$
16	Black Orpingtons ..	W. Starke, ..	61	115	229	$241\frac{1}{8}$			
		Mulder's Vlei.	62	75	150	$159\frac{13}{16}$			
			83	93	184	$184\frac{1}{16}$	(died	26.4.07	).
			64	132	263	$265\frac{9}{16}$	415	826	$850\frac{13}{16}$
17	Buff Orpingtons ..	E. H. Winter, ..	65	115	227	$225\frac{1}{16}$			
		Newlands.	66	70	112	$124\frac{15}{16}$			
			67	128	162	$219\frac{13}{16}$			
			68	134	267	$283\frac{3}{4}$	447	768	$853\frac{9}{16}$

Final Result of the Western Province Agricultural Society's Egg Laying Competition—*continued.*

Pen No	Breed.	Owner.	Hen No.	Total Eggs.	Points.	Weight—ozs.	Totals per Pen. Eggs.	Totals per Pen. Points.	Totals per Pen. Weight ozs.
18	White Leghorns ..	F. P. Kirkland, Pretoria. ..	69	63	117	118			
			70	175	332	351 1/8			
			71	146	291	293 7/8			
			72	91	175	173 7/8	(died	19.12.06).	
							475	915	936 5/8
19	Brown Leghorns ..	S. Smith, Wynberg..	73	109	206	205 3/16			
			74	149	292	291 7/8			
			75	142	170	240			
			76	115	228	230 13/16	515	896	967 3/8
20	White Leghorns ..	Mrs. A. A. Dunn, De Tuin, Piquetberg. ..	77	113	226	245 1/2			
			78	174	344	340 13/16			
			79	19	34	34 5/8	(died	28.10.06).	
			80	125	232	231 3/16	(died	19.4.07).	
							431	836	852 1/8
21	White Leghorns ..	R. Archibald, Kimberley. ..	81	47	94	95 [illegible]			
			82	70	140	16[illegible]			
			83	39	78	87 9/16			
			84	98	176	184 13/16	254	488	530 1/8
22	Buff Orpingtons ..	E. Bawden, Carn Brae, Rondebosch. ..	85	97	192	195 1/2			
			86	95	180	179 7/16			
			87	124	187	218 5/16			
			88	121	188	218 7/8	437	747	812 1/8
23	Buff Orpingtons ..	A. B. de Wet, Durbanville ..	89	190	316	347 1/4			
			90	132	258	261 1/16			
			91	129	248	244 3/16			
			92	32	64	66 7/16	483	886	918 15/16
24	Plymouth Rocks ..	S. Smith, Wynberg..	93	132	202	235 1/16			
			94	37	70	68 1/4	(died	12.10.06).	
			95	153	186	257 7/16			
			96	97	171	178	419	629	738 5/8

In scoring, two points were given for every egg weighing over 1¾ oz., and one point for every egg weighing 1¾ oz. or less. The first prize (value £3 3s., presented by Mr. A. Barry) has been won by Pen No. 3, with the score of 1,302 points. This pen also gains the special prize of £5, presented by Mr. Edward Pillans, for the pen laying the greatest weight of eggs, and the special prize, value £1 10s., presented by Mr. L. Frank, for the individual hen (No. 11) making the highest score, and the special prize of £3 3s., presented by Mr. G. B. van Zyl, for the pen laying the greatest number of eggs. The second prize, value £2 2s., presented by Mr. L. Woodhead, goes to pen No. 10, with the score of 1,097 points. This pen also carries off the special prize of £3 3s., presented by Mr. A. C. Buller, for the pen of Buff Orpingtons making the highest score. The third prize, value £1 1s., presented by Mr. F. Plant, goes to pen No. 4, with the score of 1,083 points.

A. A. PERSSE, Secretary,
Western Province Agricultural Society.

CORRESPONDENCE.

Correspondence and contributions are invited on all subjects affecting the Farming Industries of South Africa, suggestions for consideration or hints as to improved methods being particularly welcome.

Questions are also invited. In this department, every endeavour will be made to procure the desired information for publication in the next issue, but this cannot be guaranteed in the case of letters received after the 20th of the month. Should a correspondent deem his enquiry urgent, he should say so, and an answer will be returned *through the post* as soon as possible.

All letters or contributions should be plainly addressed: "The Editor of the *Agricultural Journal*, Department of Agriculture, Capetown;" they should be written on one side of the paper only, and be accompanied by the name and postal address of the writer, not necessarily for publication, but as a guarantee of good faith. A *nom de plume* may be attached for publication.

"Bare Fallows."

To the Editor, AGRICULTURAL JOURNAL.

SIR,—When I wrote to your *Journal* respecting the above subject, it was to give your numerous readers the benefit of my experience here, and not to dictate to any one (that I leave to experts), but I cannot leave Mr. J. Rushforth's letter unanswered. First, Mr. Rushforth cautions young farmers not to follow too closely in cleaning their land. Now, Sir, I contend we cannot grow two crops at the same time (weeds and corn); for myself, I prefer growing three good crops to four bad ones, which is often done here and at Home. My advice is to clear thoroughly before sowing; you cannot after.

I own I know nothing of the Eastern Province, but if the sand there is lighter than ours, it is very light indeed. I was told a few years ago, by a good man, too, that I must not hoe this land or the sand will blow away. Well, Sir, I have hoed, and kept the crop clean, and when it came off the land was clean and fit for cropping again, and the sand had not blown away.

I have heard of ploughing in a crop of tares for manure (done it myself with good results), but would prefer ploughing weeds two or three times, and burning them to kill all seeds, for I never found much manure in weeds (except made into dung in a cow-yard).

I must tell Mr. Rushforth I have yet to learn that sun and air causes barrenness to land (thought just the opposite); having grown swedes on these sands weighing 20 lbs. each by well ploughing and dunging the land; also three crops of green forage per annum, which is done by high farming. My experience is good farming answers best here as well as in England. The following maxim was given from father to son: "Manure and crop, breed and fat, and the devil can't get over that."—Yours, etc.

E. GOLDSMITH.

Newlands, June 24th, 1907.

The Buckeye Incubator.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your issue of October, 1906, is an article signed "A. Bucher, late Army Nursing Sister," *re* incubating, and recommending a 50 egg capacity incubator, costing about £1, made by the Buckeye Incubator Co., in America. Could you or any of your readers inform me if these machines are obtainable in South Africa, and, if so, who the agents are.—Yours, etc.

W.

Middelburg, C.C.

Apple Trees made Blight Proof.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—It may interest some of your readers to know that I succeeded five years ago, after 45 years' experimenting in England and here, to make the *worst* Aphis blighted apple tree absolutely and permanently blightproof, not merely blightfree. Anyone who will send me a number of badly blighted trees of any age, but not above about five feet long, to be made proof, at 4d. per tree, or who wishes me to supply him with my own blightproof trees at half of nurserymen's price cash, and half after three years, without interest, will convince himself of the fact, or the money will be returned. Blightproof trees gain vigour, fertility, and produce finer fruit.

If wished I will receive young trees with metal labels, numbers and owner's name only, suppressing the name of the kind of fruit, and return him half of each sort and retain the other half, at his disposal, after two years.

Or if any owner of blighted trees will pay my expenses I am ready to visit his farm, and operate on 100 or 200 trees. In fact I accept any reasonable condition to give an absolute proof of the *bona fide* and value of my results. Big trees are not worth the risk and trouble.—Yours, etc.,

H. FEHR.

Berlin, C.C., June 15.

Ticks on Cattle.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Having recently seen several spans of oxen, in the streets of this town, literally covered with ticks, and in view of the organised attempts which are being made to abate the nuisance and so improve the pasture lands of the Colony, it has occurred to me, that as now facilities are provided at so reasonable a cost, it should be made incumbent on all owners of cattle, more especially carriers, to assist in this most desirable object for their own and the Colony's good.

I am afraid that it would be little use appealing to the sentiment of the class of owners who can allow their dumb animals to be tortured as they are, so that drastic measures should be adopted, and to this end I would suggest that Government should empower all Municipalities to pass a bye-law prohibiting the entrance of any animal within its area unless free from ticks, and also empowering them to impound cattle belonging to any resident within the Municipality found upon any roadway therein, if infested.

I trust the matter will appeal to you as one deserving of consideration, and that you will advocate it in the columns of your *Journal*.—Yours, etc.,

HOMO.

East London, June 26.

Water Drills and Water Boring.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—As there have been several letters in your *Journal* recently dealing with the above subject, my experience of the last two months may be of interest.

On April 18th last I began boring on this farm, situated seven miles north of Grahamstown; the drill used was a large Jumper capable of boring a six inch hole to a depth of 800 feet. Before starting I warned the owner of the drill, a man with some twelve years' experience of boring in this Colony, that he was certain to meet with hard rock. He assured me, however, that with this particular drill he was not afraid of any rock he might meet with.

At a depth of about forty feet water began to make its appearance, and the amount gradually increased as the drill went deeper. From time to time narrow bands of fairly hard rock were met with, and though slow the drill negotiated them successfully. At a depth of 124 feet, however, and when the drill had been working two months, rock was struck which the drill was quite incapable of penetrating, one steady shift of eight hours' drilling not increasing the depth by a single inch. It was therefore useless to go on, and much to my disgust I had to abandon the hole just when it looked most promising.

E.

The supply of water at a depth of 124 feet amounted to one thousand (1,000) gallons an hour, and there was every indication of an abundant supply at a greater depth. I was prepared to go to a depth of three hundred feet, and did not expect to get much water above 150 feet. As I require the water for irrigation purposes, the amount obtained, though valuable, will not go far when used to irrigate land.

From this experience, therefore, it is obvious that unless a farmer is lucky enough to have only soft strata to deal with, it is useless employing a jumper drill, unless he can obtain a drill of exceptional size with a 60 foot derrick and a 35 foot stem, such as are used in America.—Yours, etc.,

C. J. LUTEMAN-JOHNSON.

Penrock, Grahamstown, June 29th, 1907.

Agricultural Shows and Judging.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have followed with much interest the correspondence in the pages of the *Agricultural Journal,* and elsewhere, on the question of the motive for agricultural shows and judging. The importance of this question would naturally appeal to every one who has the future of this country at heart, and there is no doubt that if, among other things, the present system of judging were reorganised, agricultural shows would be the best educational medium for the farmer of this country.

I think Mr. Lee can be looked upon as a man capable of great organisation, as regards matters of interest to South Africa. He says, in his letter dated the 15th April, 1907, that "another item of the work (at the meeting of the Cape Agricultural Union) will be the obtaining of judges, and how far they can be induced to report more fully their reasons for their conclusions, and it may result in a conference of judges." This latter project should indeed at least result in more uniformity of awards at shows, and let us therefore hope that the criticisms on judging will bring about such a desirable issue. Would it not be as well to have, as near as possible, set standards of excellence for each class of exhibit, whereby judges could be guided in making their awards? If this were done the judges could point out conscientiously why certain exhibits are awarded prizes, and in what way unsuccessful exhibits are deficient. This then would be education, which, I believe, is the chief motive of agricultural shows. I should suggest that the farmers, assisted by Government experts, should have the strongest claim to setting such projected standards of excellence, and, therefore, that it should be done through the Farmers' Congress, which represents a large proportion of their number. Undoubtedly, owing to the present system of judging, the aims of stock breeders and producers are influenced to a certain extent, either to improvement or detriment, by the unlimited fancies, or the individual experiences, of the few honoured persons who may be obtained, irrespective of their knowledge, to judge at shows.

The question should also appeal to those interested: "Are the judges and societies entirely to blame for the unsatisfactory state of affairs?" Certainly not! Much blame can be attributed to the exhibitors and farmers themselves, who are often loudest in their criticisms. Speaking as a farmer, I do not think we can expect the Agricultural Societies to suitably organise their shows and system of judging, unless we tender them our suggestions. not singly, but as a body, and support chiefly those societies which will organise a show which will prove useful and more educational.

Among other things, there should be an unhoused section in the prize list, for stock, etc., reared and kept under natural conditions, and practical tests for agricultural machinery, etc. The absence of this section is (though perhaps by many not willingly admitted) one of the chief causes of dissatisfaction with the judging at shows. An unhoused section for stock, especially sheep, should be of the greatest importance to the majority of farmers, because awards in this section could be decided more easily, and with more confidence perhaps, by many of the now desirable but wisely unwilling authorities on stock, and the result would not, I think, be so misleading as in the case of animals that have been housed and fed to perfection for the show. Of course, that is if the aim of farmers is to produce animals which would prove profitable under natural conditions. How often, for instance, does not the experienced sheep farmer see a sheep awarded a prize which if subjected to the natural conditions of South Africa would prove utterly unprofitable.

So the fact remains that the inducement to individuals, who care only to make money at the shows, is strikingly apparent, but it must be admitted that such an inducement will only cause pitfalls in the future field of general advancement and prosperity.

Would it be impracticable to hold an annual agricultural show, say, in the most conveniently central town for South Africa, under the auspices of a united South African Farmers' Association, or a united South African Stock-breeders' Association?

I would suggest that those who are interested in shows, as regards their educational value and advancement in quality of local production, should approach the Cape Agricultural Union, through the medium of representatives from their several Farmers' Associations, with a view to improving the present unsatisfactory results of agricultural shows, so that breeders and producers may be able to carry on their respective industries and farming with fixed aims, which cannot then be influenced by the unlimited fancies of a few judges.

Perhaps I have asserted rather too strongly my views on this subject. However, I trust that such will not be taken amiss, but lead to still further correspondence, nay, suggestions, on this important question.

All those farmers who in the future would be proud of their attainments should honour one of their would-be educators, viz., agricultural shows, with their united support, and with suggestions in organising a more encouraging and educational style of show.

Thanking you, Mr. Editor, for the space in your valued pages.—Yours, etc.,

C.C.V.

Leeuwfontein, 17th June, 1907.

Citrus Failures at Mossel Bay.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—There is on my farm an orchard of about 130 orange trees planted on good river (alluvial) soil. These trees are now about thirty years old, and generally produced fine healthy fruit. But about five years ago one of the trees commenced to yield fruit of no larger size than pigeon-eggs, although the tree was healthy in appearance. This production of small fruit continued for the last two years, and there are now about fifteen trees similarly affected. Some of the trees bear fine healthy fruit on one side, but show the small juiceless specimens on the opposite side. The trees producing the small specimens are most close together on one side of the orchard.—Yours, etc.,

C. B.

Platjeskraal, District Mossel Bay,
June 20, 1907.

From the description these trees seem crowding each other out, and consequently starving each other. They are presumably seedlings, and as such demand plenty of space. They should be about forty feet apart, so the best thing to be done is to cut out sufficient to allow the others to be about this distance apart. There should be no loss of fruit, for the trees remaining should make up both in quantity and quality for those taken out. Then the orchard should be well cultivated and manured with well-rotted stable manure and basic slag (Thomas' phosphate).—E.P.

Tagasaste or Tree Lucerne.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the May issue of the *Agricultural Journal* I notice some remarks about the Tree Lucerne (Tagasaste). I may mention that some years ago a friend at Wellington sent me three seedling trees, describing Tree Lucerne as a supposed valuable fodder plant that would thrive well on hillsides, and was considered fairly drought resistant. Two of these were handed to two fellow farmers of the Ruggens (the hilly country between River Zonder End mountains and the coastal hills) with a view to testing the drought-resistant qualities of the plant, but unfortunately my friends neglected the young trees and could not give me any information about them later on. One tree I planted on my farm here, close to some blue-gum trees, but under irrigation. It seems to hold its own in the presence of the blue-gum, but I must say that there seems to be no attraction in its leaves, to animals, as a fodder plant. It is now about 18 feet high, much resembles a willow tree in shape, and is very pretty when in blossom, but neither cattle nor horses ever seem to touch it, while they freely eat the leaves of the willows and even oaks on the farm. This fact induces me to conclude that its qualities as a fodder plant must be regarded as very insignificant, in this part of the Colony at any rate.—Yours, etc.,

LOUIS KNOBLAUCH.

Appels Kraal, River Zonder End, June 1.

Heartwater, Pasteurella or What?

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the June number of your *Journal* I notice among the "Notes" a request from Mr. Jesse Long *re* the *post-mortem* appearances of a pure or uncomplicated case of heartwater in sheep. In reply, you quote Dr. Edington's description of these appearances. I take it, therefore, that you quite agree with him. Now, I was at the Bacteriological Institute when a large number of experiments were carried out on heartwater, and I may say I agree generally with Dr. Edington's description. Allow me to confine myself to only one organ, viz., the lung. Dr. Edington states that "the lungs are pale and the lobules may be slightly separated by the exudation which occurs along the lines of the inter-lobular septa." If this be a correct description, how was it that all the inoculated sheep which died at Coles Lane showed, on *post-mortem* examination, lungs deeply congested? In only one was the congestion patchy, and these patches looked like liver substance. Unless one can distinguish between heartwater and Pasteurella in sheep and goats, it will be almost impossible to explain such contradictory statements, *e.g.*, that Persian sheep do not die of heartwater, and that they do; or that animals recovered from heartwater are permanently immune, and that they are not; or that Bonte ticks produce heartwater, and that they do not.

As far as I can judge, the Coles Lane experiments showed that if sheep acquire any disease—on the veld or otherwise—which can lie dormant for some time, when they are infected in any way (viz., by the bites of ticks) the disease which is lying dormant springs into activity with very frequently a fatal result. And from the state of the lungs and some other *post-mortem* signs I have come to the conclusion that all the inoculated sheep at Coles Lane were infected with Pasteurella, which lay dormant in them till stirred into activity by the ticks. Even the sheep which died of Anthrax was also infected with Pasteurella, which organism was obtained by cultivation from one of the enlarged lymphatic glands of this animal.—Yours, etc.,

GEO. CARRINGTON PURVIS.

P.S.—The sheep that died of Anthrax had a good deal of water in heart bag, but the liquid was blood-stained.—G.C.P.

Grahamstown, July 2nd, 1907.

Bots in Horses.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Having read in the *Agricultural Journal* of May, 1907, an article *re* Bots in horses, I would like to give you a recipe taken from Dr. Chase's recipe book and ask you if there is any reliability to be placed on it.

Receipt.—The Department of Agriculture publishes the following experiments which a gentleman from Georgia tried and found effective in dispelling serious trouble in horses. He says:—About thirty years ago a friend lost, by bots, a very fine horse. He took from the stomach of the dead horse about a gill of bots, and brought them to my office to experiment upon. He made preparations of every remedy he heard of, and put some of them in each. Most had no effect, a few effected them slightly, but sage tea, more than anything else, that killed them in fifteen minutes.

He concluded he would kill them by putting them into nitric acid, but it had no more effect on them than water. The third day they were as lively as when put in.

A bunch of tansy was growing in my office; he took a handful of that, bruised it, added a little water, squeezed the juice, and put some bots into it. They weree dead in one minute. Since then I have given it to every horse, and have never known it to fail of giving entire relief.—Yours, etc.,

GEO. DORAN.

De Erf, Richmond, June 10, 1907.

Wire-Worm and Blue-Tongue in Sheep.

To the Editor, AGRICULTURAL JOURNAL.

loser through wire-worm. Finding that when external signs of the presence of wire-

SIR,—With regard to Mr. M. Versfeld's remarks *re* wire-worm in the May issue, I may point out that some time back I wrote to the *Agricultural Journal* drawing farmers' attention to the successful treatment of sheep suffering from wire-worm by drenching them with Sulphate of Copper. I had at the time been a very heavy worm in sheep were noticeable the use of bluestone was of little avail, as the sheep

invariably died after dosing, I concluded that the sheep, when outward signs were visible, were often too weak to stand the dose that would kill the wire-worm. Here January and February are generally the months during which outward signs of the presence of wire-worm appear. I started dosing my sheep all round on the 1st of October with bluestone, and a fortnight later, on the 14th and 15th October, I repeated the dose. This I did for two consecutive years, and since then have had very little trouble with wire-worm. My contention was that wire-worm in its embryonic state was picked up by its host about September. In October it had sufficiently developed to be attacked by destructive medicines. Wire-worm in that infant stage was so weak, and the membrane of the sheep's stomach so uninjured that the dose of bluestone, which at that stage would kill the wire-worm, proved harmless to the sheep. As Mr. Versfeld's experience seems to bear out this contention, it would be well if farmers who are troubled with wire-worm amongst sheep would make tests as above suggested. Last summer wire-worm was very troublesome along River Zonder End, and I have resolved to revert to my experiment of years ago, and backed up by Mr. Versfeld's experience, I think it only fair towards stock to adopt this system of early dosing.

In view of the discovery made by the Transvaal Veterinary Department of a cure for Tonguesickness, through which disease Colonial stock-farmers lost very heavily last summer, would it not be well if our Agricultural Department arranged for a test of this valuable discovery to be made here when Tonguesickness breaks out again next summer?—Yours, etc.,

LOUIS KNOBLAUCH.

Appels Kraal, River Zonder End,
1st June, 1907.

Krimpziekte.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—As many remedies for stock diseases are given in your *Journal* I should be glad if you could inform me what is the best cure for "Krimpziekte," as this disease is rapidly increasing amongst sheep and goats. I would certainly estimate the annual loss from this disease at 500 sheep and goats from O'okiep *via* Springbok to Bowes Dorp, the northern side of this pass. We have tried many remedies but failed to hit upon the right one, so I turn to you or the veterinary staff of your Department for advice. Some animals get the disease in their neck, in others it affects the back, and again in others the region of the heart. There was a great deal of rain up to June 7, 1907. After that very little.

Could you also let me know what variety of grape is the last in the season to ripen here in Namaqualand. In some parts, viz., the Kamiesberg, they ripen very late, and I think that if we could get a variety which begins to ripen from the 15th of March, and to bud from the 15th of November, it would answer well in this district, viz., the Kamiesberg.—Yours, etc.,

J. H. VAN NIEKERK.

The exact cause of Krimpziekte has not been definitely ascertained, beyond the general belief that it is traceable to certain forms of herbage eaten by stock at certain periods. These plants are fairly well-known to the farmers of the affected districts. It follows, of course, that the only reliable remedy, or rather preventive, is the total eradication of the suspected plants from the grazing veld. Although this may look a rather formidable undertaking it would prove the most economical in the end. It is also recognised that driving aggravates the nervous irritation very much. It is of great advantage, therefore, to pick out every animal from the general flock as soon as the slightest symptoms of the disease appear, and leave them as quiet as possible near to where they can readily get to drinking water. As to treatment, the late Mr. Hutcheon always advised a dose of physic, to assist in clearing out the liver and digestive organs. Three to four ounces of Epsom Salts dissolved in half a pint of warm water is a good dose. Then follow this up by one drachm doses of Chloral Hydrate dissolved in a cup of water three times a day until the symptoms abate.

We have no information as to the varieties of grapes suitable for Namaqualand. Perhaps some of our correspondents may be able to offer some advice on the subject.

Lime and Sulphur and Wool.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Please allow us a few lines in which to reply to Mr. S. H. Probart's letter in last month's *Journal*.

The sample of wool referred to was sent to us for our opinion, and we were asked to state what dip had been used on it. We replied that we could trace no sign of any dip in the wool, and added that, *if any dip had been used, it had apparently been*

washed out by rain. Mr. Probart has omitted to mention this the most important feature of our remarks in reply to his enquiries. The wool was examined by an expert wool buyer here, who found it to be good and sound.

Mr. Probart appears to think that this experience of his with us disposes of the universal objection to Lime and Sulphur. It does nothing of the kind, however, and it is now too late in the day for anyone to claim for Lime and Sulphur that it is innocuous to the fibre of wool. That it is exceedingly damaging has been long ago demonstrated by every firm in Europe and America who have the handling of wool.

If Mr. Probart could follow Lime and Sulphur-dipped wools into the Wool Washers' sheds and Wool Combers' mills, and watch results, he would, we are sure, be rapidly induced to modify his present views.—Yours, etc.,

WM. COOPER & NEPHEWS.

East London, July 2nd, 1907.

Lime and Sulphur for Scab.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—There exists a great diversity of opinion about dipping of sheep amongst stock-owners. One recommends Cooper's Dip, another Hayward's; other farmers again preferring some other of the numerous brands of dipping material used in South Africa. But permit me to give my experience in this matter. For nine years I have dipped my sheep regularly with Cooper's Dip, yet I have never been six months without scab; moreover there were always sickly sheep among my flock which were troubled with ulcers on their body. Then I have used Tobacco Extract and Hayward's Dip for a period of two years, but neither of these gave complete satisfaction. A year ago it was suggested to me to try Lime and Sulphur Dip. I now use this in the proportion of 25 lbs of Sulphur and 20 lbs. of fresh Lime to 100 gallons of water, with the result that my sheep ever since have been perfectly healthy both internally and externally. So I am of opinion that if every farmer were to use this dip scab would before long completely disappear.

Now, as regards the length of time the sheep should remain in the dip. For this purpose some farmers use an hour glass ("zandglaasje," as we say here), while others go by their watch, but with the majority it is only guesswork, so that they never can be certain that the sheep remain in the dip for the required two minutes. Would it not be possible to construct a clock (which we should call "Dip Clock") only to be used for dipping purposes, and striking every two minutes, thus obviating all mistakes as to time. If such a clock could be obtained, I am convinced every stock-owner would only be too glad to get one.—Yours, etc.,

S. J. SCHOEMAN.

Kleinfontein, Naauwpoort Junction,
June 19th, 1907.

The Divining Rod a Fraud.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your June number, Mr. Bowker claims many very strange powers with the divining-rod, even going so far as the following: "The old scientific theory of catchment water is to a great extent upset by my new discoveries." He means, no doubt, the fact that there is a large quantity of water held in porous rock strata, slowly but continually percolating to lower levels, but dammed back here and there by impervious dykes. At least, it is a fact to me.

Now, Sir, I have never seen a divining-rod, nor do I know how such an instrument is used. But, when I hear a man state that he discovers underground "streams" by its use, I must doubt the *bona-fides* of the instrument. Where are these wonderful streams geologically? And what a parlous condition our already too dry country would be in if there were thousands of such streams constantly draining our subterranean reservoirs?

I fear the only "stream" Mr. Bowker is likely to find underground is the run from a larger subterranean cavity than usual into his borehole, when he is pumping, and the leakage of an underground cavity through some fault in an ironstone dyke.

In his enthusiasm, Mr. Bowker even challenges Sir Isaac Newton's great discovery. He finds splendid "streams" by boring on the tops of hills. I would like to hear more from Mr. Bowker, and especially as to where he places his "streams" geologically. I enclose my card.—Yours, etc.,

SCEPTIC.

Orange River Colony, July 3, 1907.

RURAL REPORTS.

Albert, June 15.—Heavy rains fell during the last month, and the weather is very cold and changeable, with heavy frost. The condition of the veld is excellent for the time of the year. Cattle doing well. Calving good. Horses mules and donkeys also in fair condition for the time of year. Market firm; riding and draught horses from £20 to £25; mules about £15.

Bathurst, June 12.—Weather windy and cold, veld fair. In fruit there is a fair crop of oranges and naartjes, but scale is troublesome. Mealie crop good. Kafir corn fair. All descriptions of cattle doing fairly well. Bastard Persian sheep and Boer goats also doing well; ostriches and pigs fairly promising.

Clanwilliam, June 22.—The rainfall has been excellent, and compares very favourably with former years. The veld is good for the time of year, and everything points to a good winter. The cereal crops were not so good as in former years, with the exception of rye. Cattle generally doing well; but dairying is not carried out much here. Good horses are scarce, and rule from £20 to £30; mules about £15. Small stock doing fairly well; ostriches and pigs also doing fairly well

East London, June 11.—High, cold winds have prevailed, and a little rain would do good. The veld, however, keeps good, and pasturage is abundant, with plenty of water. Young oats are looking well in some parts, but the mealies have suffered, and the crops generally will not be very heavy. Kafir corn should give a fair crop. In fruit, oranges and guavas are plentiful, but scale and the fly are doing a great deal of harm. Cattle generally in normal condition, with some cases of lung-sickness. Slaughter cattle in fair condition, prices drooping.

Fort Beaufort, June 14.—Weather has been wet and rather cold; veld continues good. Wheat and oats now being sown; mealies have yielded an indifferent crop. General condition of cattle good, with a good calving. Dairying is falling off; slaughter stock plentiful. Horses keep in fair condition. Merino sheep are not doing so well; wire-worm is prevalent on some farms, and in some instances is killing lambs two months old. Slaughter stock not up to the mark. Ostriches seem to be doing well, and are beginning to breed, which is particularly early.

Graaff-Reinet, June 15.—Country looking well. Swarms of locusts reported in some parts. Large and small stock in excellent condition, and ostriches doing well.

Hay, June 10.—The rains were exceptionally good to the end of May. Fine, mild days have followed, with cold nights and heavy frosts. A fair quantity of wheat is being sown this season, and mealies were good where the locusts did not destroy them. Cattle doing well; slaughter stock fairly plentiful, but very little demand. Horses, mules, etc., doing well; as also is most of the small stock.

Indwe, June 12.—Locusts have done a great deal of damage in some parts, and more trouble is anticipated in the spring, as they are breeding in the district. The mealie crop is estimated at about half what it should have been. Stock generally doing fairly well.

King William's Town, June 6.—Weather windy and cold in most parts of the district; veld fairly good. All stock reported to be doing fairly well.

Ladismith, June 19.—Weather cold and wet: good rains on the 5th and 7th; veld excellent. In fruit, oranges should give an average crop. All stock doing well.

Middelburg, June 15.—Weather very cold; veld good. Rains have been far above the average. A large amount of wheat is being sown, but very little oats. Mealies are a record crop for the district. Stock generally doing well; lambing fair. Large slaughter stock in good condition, small fair. Ostriches and pigs doing well.

Montagu, June 19.—Heavy rains in December caused some rot in the grapes, but the crop was heavy and vintage excellent. Large stocks of brandy now on hand, and distilling practically completed. Seasonable rains have enabled farmers to plough extensively for cereals. Much of last season's oat crop was washed away by the December floods, and what was not washed away was so thoroughly saturated as to cause it to turn black and musty. Good vat sheaves were consequently scarce, but the excellent lucerne caused the lack not to be felt much. Stock generally in excellent condition; mutton rules a fraction lower. Ostriches in good condition, and the price of feathers has ruled high. Although at present there is a slight decline, yet prices are still good. A great deal of fencing has been carried out during the past few years, and is still going on. Largely owing to codlin moth fruit culture does not command the attention it should, beyond citrus fruits. At Concordia, in the "Coo," a very good description of apple is grown, known locally as the "Koo Zuur," from its sub-acid flavour. Apples can be grown with advantage in this part of the division, owing to its altitude—about 2,200 feet above sea level—and the considerable cold which prevails there. Hitherto the "Coo" has been free from codlin moth, but it has unfortunately made its appearance there this season. These apples are much sought after, and the entire crop is usually purchased by speculators months before the fruit ripens. This apple, if carefully handled, will store for months, hence its value. Oranges and naartjes promised well, but the crop is not quite so heavy, in parts, as last season. There is no sickness in stock anywhere in the division, and the veld is good. Generally speaking, if the rains continue with fair regularity, a good season may be anticipated in every branch of agriculture.

Oudtshoorn, June 19.—Weather windy and cold, with some heavy frosts. Veld fairly good. Cereals now being sown, and some large crops are being put in, of wheat particularly. Citrus fruits are yielding good crops where the trees have been fumigated, but red scale is still prevalent in some parts. Stock generally doing fairly well considering the cold weather. Redwater was introduced into the Kombuis ward from another district, and six animals succumbed. Ostriches doing well where food is plentiful; "vrotmaag" prevalent in some places. Winter chicks doing well.

Peddie, June 15.—Weather cold and windy; veld keeping fairly good. Young crop of oats thriving. Mealies mostly harvested, crop estimated at about a half. The Kafir-corn crop also turned out very poor. Cattle generally in fairly good condition. Calving poor. General condition of ostriches fairly good; birds beginning to breed.

Prieska, June 10.—Weather fine, with cold nights. Light rains fell during May. Nothing fresh to report as to cereals. Stock generally doing well, as the veld is good.

Queenstown, June 3.—Locusts have been numerous, and done a lot of damage to crops, particularly along the Zwart Kei. Weather wet, cold and windy. Stock generally in good condition. Winter lambing season now on. Slaughter stock good and fairly plentiful.

Robertson, July 1.—Weather fair but cold, with light rains. Fair quantities of cereals sown, which are looking well so far, but are too young to say much. Lucerne still doing well—present the resting season. Citrus fruits doing well. Phylloxera is making rapid headway in some vineyards which have not as yet been reconstituted. As the veld remains fairly good, all stock seems to be doing well.

Somerset East, June 15.—Weather changeable, with some fairly severe hail-storms. Veld good. Wheat and oats being sown; mealies gave a fair crop. Stock generally doing well. Slaughter sheep plentiful, but no demand.

Steynsburg, June 12.—Weather changeable. No rain during the past month. Wheat and oats now being sown; lucerne doing well. Stock generally in fair condition.

Stutterheim, June 12.—Weather cold and windy, with frosty nights. Rainfall light, but compares favourably with other seasons. Veld scorched by frosts. Good quantity of oats being sown for winter feeding. Mealies only gave a medium crop, on account of the wet season. Kafir-corn attacked with blight. Cattle are not doing so well just now in some parts of the district. Sheep on the whole in fair condition.

Upington, June 17.—Grass absolutely destroyed by locusts at the beginning of the year; bush veld fairly good. Rainfall good up to May. Weather fair. Stocks generally doing fairly well. Nothing to report as to crops, as this is the off-season here.

THE TRANSKEI.

Mount Ayliff, June 13.—Weather cold, with light rains. Veld good, burning just beginning. Mealies a good crop. Kafir-corn exceptionally good. Stock generally doing well.

Nqamakwe, June 13.—Rainfall for past month, 2·33 in. Weather cold and stock falling off in condition. No locusts have as yet visited this district.

Tabankulu, June 10.—Beyond a heavy thunderstorm during early part of last month very little rain has fallen. Heavy crops are now being gathered, and there will probably be a large surplus of grain, which will be wasted for want of a market. Several outbreaks of lungsickness have occurred. All stock in fair condition, and fit to stand the winter, which promises to be colder than usual, owing to the heavy rains in the autumn.

Mount Frere, June 29.—The weather has been seasonable during the month. There has been no rain, and a shower would do no harm, provided it was not followed or preceded by cold winds or frost. The crops are now nearly all harvested. The Kafir corn crop in three-fourths of the district is heavier than it has been for some years. The mealie crop is an average one. Pumpkins and potatoes have been a failure, and beans are fair. Stock are in fair condition. Goats and sheep are kidding and lambing, and, so far, the young are very good. There has been one more outbreak of lungsickness in a herd which was in contact with affected cattle. The Government Inoculator has been busy for the last two months, his work has, however, been delayed by the supply of virus running short. Many natives are anxious to have their cattle inoculated. It is as yet impossible to state whether this inoculation has been effective.

NOTES ON THE WEATHER OF MAY, 1907.

By CHARLES M. STEWART, B.Sc., Secretary to the Meteorological Commission.

A mean barometric pressure, considerably lower than the average, accompanied by exceptionally cold, cloudy, wet weather, the mean rainfall being three-quarters more than usual, and practically general over the whole country, an unusually large number of thunderstorms, frequent hail and some falls of snow, generally light, during the second and last weeks of the month, a prevalence of North-westerly winds, sometimes attaining the force of a gale, frequent and severe frosts, and practically daily local fogs, were the leading features of the weather of this month.

DIVISION.	Mean Rainfall (1907).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	10·58	18	4·80	9	+5·78	+120
South-West ...	5·89	13	2·90	7	+2·99	+103
West Coast ...	2·26	9	1 51	5	+0·75	+ 50
South Coast ...	3·39	10	2·36	6	+1·03	+ 44
Southern Karoo ...	·92	4	0·99	4	—0·07	— 7
West Central Karoo ..	·90	5	0·85	3	+0·05	+ 6
East Central Karoo ...	1·01	6	0·79	3	+0·22	+ 28
Northern Karoo ..	2·01	5	0·85	3	+1·16	+136
Northern Border ...	·94	6	0·62	3	+0·32	+ 52
South-East ...	2·79	9	1·35	5	+1·44	+107
North-East ...	2·08	6	1·02	4	+1·06	+104
Kaffraria ...	1·45	12	1·10	4	+0·35	+ 32
Basutoland ...	3·42	12	1·38	4	+2·04	+148
Orange River Colony...	2·00	9	1·04	3	+0·96	+ 92
Durban (Natal) ...	·73	10	1·79	...	—1·06	— 59
Bechuanaland ...	1·39	7	0·50	1	+0·89	+178
Rhodesia ...	·15	1	0·45	1	—0·30	— 67

Precipitation.—The mean rainfall, deducted from the records of 342 raingauges, amounted to 3·21 ins., falling on 9 days of the month, being 1·40 in., or 77 per cent. above the average, and practically the same as in the preceding month. An examination of the accompanying table will show that this supra-normal rainfall was practically common to the whole country, the only exceptional areas being the Southern Karoo, Rhodesia, and Natal, as far as can be judged from the Durban record; over these parts there was a deficiency amounting to 7, 67, and 59 per cent. of the respective averages for the month. It will be noticed that most of the other divisions have practically double their usual amounts, the excess ranging from 148 per cent. in Basutoland to 28 per cent. over the East Central Karoo. As far as the Cape Peninsula is concerned, the mean rainfall constitutes a record for the last 17 years (being the period for which the means have been calculated), the next highest having been 8·38 ins. in 1901. An examination of the Royal Observatory records since 1841 shows that the rainfall for May last (6·29 ins.) was exceeded on twelve former occasions in this same month, the maximum having been 13·46 ins. in May of 1877. A noteworthy feature of the nature of the rainfall is the unusually large number of days on which it fell over each division, showing that on the whole the precipitation was of a comparatively light, soaking nature, well suited for agricultural operations, and admitting at the same time of its running off into dams, etc., most of which are reported as being full all over the country. In consequence of these late heavy rains, the outlook for farmers is as bright as it ever has been, were it not for the destruction liable to be caused by locusts and other pests. An analysis of the totals for the month shows that of the 342 stations reporting, only two (2), Calitzdorp and Hopefountain, suffered from "absolute drought" throughout the month, and only 60 had from 0·01—1 in.; whereas 103 had 1·01—2 ins.; 66 had 2·01—3 ins.; 31 had 3·01—4 ins.; 21 had 4·01—5 ins.; 11 had 5·01—6 ins.; 18 had 6·01—8 ins.; 12 had 8·01—10 ins.; 6 had 10·01—12 ins.; and 5 had 12·01—14 ins., leaving seven (7) with more than 15 ins.; of these last the largest amount recorded was 20·45 ins. at Waai Kopje (Table Mountain).

after which follow St. Michael's (Table Mountain), with 18·45 ins.; Newlands Reservoir (Nos. 1 and 2 Gauges), with 17·96 and 16·87 ins. respectively; Kasteel Poort (Table Mountain), with 16·70 ins.; Newlands (Montebello), with 16·37 ins., and Bishopscourt with 15·65 ins. On similarly treating the maximum amounts recorded in 24 hours, it is found that of the 325 stations furnishing the necessary details (and omitting the two (2) with "Nil"), 217 had maxima ranging from 0·01—1 in.; 77 had from 1·01—2 ins.; 17 had 2·01—3 ins.; 5 had 3·01—4 ins.; 4 had 4·01—5 ins., whilst three (3) had records exceeding five (5) inches in one day, viz., Evelyn Valley, with 5·83 ins. on the 6th; Bishopscourt, with 5·40 ins. on the 30th, and Kenilworth, with 5·15 ins. on the same date. Of the twelve stations where the greatest fall in 24 hours exceeded 3 inches, nine (9) were situated in the Cape Peninsula; one (Ceres, with 3·74 ins. on the 30th) in the South-West division; one in the South Coast, viz., Cape St. Francis, with 3·25 ins. on the 27th, the last being Evelyn Valley, in the South-East Division, already mentioned. *Thunderstorms* were numerous and of wide extent for this season of the year, there being reported no fewer than 383 instances of this phenomenon on 25 days of the month. They were most widely noted on the 5th, 20th and 25th, particularly on the first-mentioned date, and were also fairly numerous from the 14th to 16th, and on the 19th and 24th. *Hail*, apparently of the nature of "Soft Hail," was an accompaniment of these storms at 54 places on seventeen (17) days, notably on the 5th, but also commonly on the 16th, 20th, 25th and 26th. *Snow* was reported, chiefly from the more elevated stations, from 41 stations on 14 days of the month, viz., 10th to 13th, 15th, 16th, 20th and 25th to 31st. The stations at which these falls occurred are situated in all parts of the Colony, from Lilyfontein, in the West, to Kokstad, in the East, and from Leribe, in Basutoland south. to Blaauwkrantz, in the Knysna division. The ground continued white for some time on the 12th at Stormberg, on the 27th at Kokstad, and on the 28th and 29th at Leribe, in Basutoland. The heaviest fall seems to have occurred at Cyphergat, on the 12th, when the snow was reported to be 3 inches deep. Precipitation assumed the intermediate form of *Sleet* at 23 stations on 11 days, viz., 6th, 10th to 12th, 15th, 25th to 29th, and on the 31st, chiefly, however, on the 11th and 26th.

Temperature, Cloud and Wind.—The mean temperature of all the stations was exceptionally low (54·4°), being 2·5° lower than the normal and 6·7° colder than the previous month. This unusual coolness was almost entirely due to the mean of the day temperatures being much lower, whilst the mean night temperature was but slightly below the average; the mean maximum (64·1°) was 4·7° and the mean minimum (44·8°) only 0·2° below the average, thus reducing the mean daily range by 4·5° to 19·3°. Low monthly temperatures were general over the whole country—the difference being least, 1—2 degrees, in the East, increasing to 2·5—3 degrees along the South Coast and over the Cape Peninsula. The departures increased to 3 and 4, or even 5 degrees, at stations situated a few miles from the South and South-West Coasts, and rising to 6·8° at Kenhardt. At the mountain stations of Disa Head and Devil's Peak, in the Cape Peninsula, the shortage amounted to about 6 degrees, whilst at Kimberley and Hopefountain it fell to 1·6° and 2° respectively. The mean maximum temperatures were everywhere considerably below the average; the differences were least (about 2° F.) at the East and South-East Coast stations, and at Hopefountain, increasing to 3—4 degrees along the South Coast and to 5—6 degrees in the South-West and over the Cape Peninsula. Inland the day temperatures were mostly between 4 and 7 degrees cooler than usual, reaching even 10·1° at Teyateyaneng, in Basutoland—the amounts increasing from East to West and from South to North. On the other hand the mean minimum temperatures were above the average at many stations in the East and Kaffraria, by amounts varying between 0·2° at Port St. John's, and 2·6° at Rietfontein (Division Aliwal North), but fell below the average at other stations in the same divisions by similar amounts. Elsewhere the deficits were mostly between 0·5 and 2 degrees, but reaching 5—6° at Devil's Peak and Disa Head, in the Cape Peninsula, and 6·5° at Kenhardt. The mean warmest station was Port St. John's, with a temperature of 63·7°, and the mean coldest Bensonvale, with 44·0°, a difference of 19·7°. The highest mean maximum was 75·9° at Hopefountain, and the lowest mean minimum 31·0° at Bensonvale. The warmest days were most commonly the 4th and 19th, although the highest readings for the month were recorded at some stations on the 1st, 3rd, 8th, 10th, 20th to 22nd, and the 25th. The coldest mornings were mostly from the 26th to 31st, most generally those of the 27th, 28th and 29th, although isolated minima were registered on the 1st and 18th. The mean of the absolute maxima was 75·9°, and of the absolute minima 34·9°, as against the corresponding values, 83·5° and 43·8° in April, a decrease of 7·6° and 8·9° respectively. The mean monthly range was therefore 41·0°, or 1·3° more than during the previous month. The extreme readings registered during May were 84·0° on the 19th at King William's Town, and 20·0° on the 28th at Bensonvale and Teyateyaneng, yielding an extreme range of 64·0° during the month. *Frost* was recorded at some stations during this month for the first time this season, and occurred at one or more stations on each day of the month. Generally speaking, the frosts were light, causing but little damage, but were unusually severe towards the end of the month, *i.e.*, from the 26th onwards.

In all, 174 instances of this phenomenon were reported as occurring on the 31 days of the month, being of most general occurrence on the 12th and from the 27th to the 31st.

One of the most noteworthy features of the weather of May was the unusually high percentage (52 per cent.) of *Cloud*, which was 1 per cent. higher even than during April, which was also an exceptionally cloudy month. The abnormally low mean maximum or day temperatures must be ascribed undoubtedly to the persistent obscuration of the sky checking the effects of insolation. Hopefountain was the only station where the mean cloudiness was less than usual; elsewhere it was mostly about 20 per cent. above the average. Over the Cape Peninsula, and as far East as Cape Agulhas, it was mostly about 70 per cent; about 50—60 per cent. along the South and East Coasts, and at some stations in the interior, *e.g.*, Amalunstein, Main, Rietfontein, etc.; but generally the proportion of cloud at the inland stations was from 35—50 per cent. The only stations where the amount of cloud was less than 30 per cent. were Tabankulu (23 per cent.) and Hopefountain (25 per cent.); the largest proportion, on the other hand, being 72 per cent. at Danger Point. The number of *Fogs* and *Mists* reported was even less than in April, 83 instances of this occurrence being noted on 30 days of the month, the only exceptional date being the 4th. These were mostly local, except on the 5th, 7th, 17th to 21st, 23rd and 24th, when they were most widely distributed.

The prevalent morning *Winds* were North-Westerly (*i.e.*, between N. and W.), except at Kimberley, where the principal direction was North-Easterly; Durban, where it was South-Westerly, and Kenhardt and Hopefountain, where it was stated to be South-Easterly. At the Royal Observatory (Cape Peninsula) there was a marked diminution of winds blowing from points between S.S.E. and W.S.W., as also of N.E. and W.N.Westerly winds, but an excess of winds between N.N.E. and N.W., as also of Westerly, S.-Easterly and E.S.-Easterly winds, but more particularly of Northern winds. The mean wind-force there was slightly above the average, the amount corresponding to a mean velocity of 0·4 mile per hour. The mean force of the morning winds of all stations was 1·78, corresponding to a velocity of 11·9 miles per hour, or 0·5 mile per hour greater than in April. The wind was reported to have attained the force of a *Gale* at 18 stations on 8 days, mostly on the 24th to 26th. *Hot Winds* were noted at two (2) stations, one on the 18th and one on the 30th.

An Earthquake Shock, lasting 20 seconds, was experienced at Port St. John's at 1.30 a.m. on the 30th.

Taken altogether, the country was in a most satisfactory condition, from the farmers' point of view, at the end of the month, the only exception taken being that at Huxley (Stutterheim); the veld was too wet for small stock. Locusts continued the whole month in the neighbourhood of Contest Farm (Bolotwa), and were reported to be breeding in the Kei Valley. It appears as if, notwithstanding the promising agricultural outlook, it would be necessary to exercise the greatest care to stamp out all insect pests and fungoid diseases as soon as they appear, if the most is to be made of the favourable conditions now obtaining.

OBSERVERS' NOTES.

VRUCHTBAAR.—The rainfall, although very heavy, was soft, soaking rains without any strong winds. The crop of oranges and naartjes, which is beginning to ripen, is not so plentiful as last season, though the quality is excellent.

THE MEADOWS.—Winter has set in properly from about the 20th. Cold North winds continually blowing.

VAN WYK'S VLEI.—Stock and veld in good condition.

HUXLEY (Stutterheim).—The veld, full of springs, too wet for small stock. On the 11th two storms passed here without any rain, only a few drops falling; one from W. to N.E., and the other W. to S.E.—most extraordinary weather for this time of the year.

BOLOTWA (Contest).—Locusts, which came April 29th, knocking about the whole month, never move away for more than few days—impossible to drive them. All crops eaten off repeatedly and killed.

KEILANDS.—Locusts breeding in Kei Valley.

THIBET PARK.—Very cold, sleety, rainy and windy.

KOKSTAD.—Very severe frosts every morning, with cold Westerly winds. Splendid mealie crops.

GROOT DRAKENSTEIN.—A very wet, cold month, with a great excess of cloudiness, the days being exceptionally cool, nearly 6° below the average, and rainfall nearly double the average. Mean temperature of month 3·2° below the average; mean maximum of month 5·9° below the average. Rainfall 4·36 inches above the average of 14 years (5·06).

KOKSTAD.—The month has been considerably colder than the average, with more numerous and severer frosts than is usual in May. The veld has now its winter aspect. Cattle are in good condition. Two hours' snowfall occurred in town on the afternoon of the 27th, and lay all night.

CARNARVON FARM.—The peculiar feature of this month has been the small amount of rain; for 9 rainy days only 0·99 inches registered, or an average of 11 points for the 9 rainy days. Although 13 frosts are recorded, they have not done much harm till towards the end of the month; even somewhat delicate grasses and weeds are only just killed at the end of the month; the wet ground and moist "air cushion" neutralises the severity of frosts. Wind: The 12 windy days are slightly above the average. Cloudless: The one cloudless day is below the average. Agricultural prospects, climatically speaking, are good; all dams and vleis full, and fountains stronger than for several years past. The only bugbear and blue look-out are locusts. Most farmers complain that all wheat sown March and April, barley and oats, etc., included, are eaten off as fast as they appear aboveground.

TEMPERATURE, MAY, 1907.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	61·1	50·2	55·6	76·8	4	41·0	29
Simonstown ...	64·3	52·7	58·5	73·4	8	46·0	26
Devil's Peak ...	57·8	45·8	51·8	74·0	8	36·0	26
Table Mountain (Disa Head)	53·2	43·2	48·2	76·0	4	34·0	27
Wynberg ...	64·1	49·7	56·9	76 8	8	39·0	27 & 28
S A. College ...	63·5	50·2	56·8	75·6	8	41·5	27
Sea Point ...	62·8	50·9	56·8	74·0	4	43·0	27
Danger Point ...	62·2	52·0	57·1	71·0	4	42·0	29
Groot Drakenstein ...	63·1	47·2	55·2	80·0	4	36·5	27
Elsenburg ...	62·6	46·3	54·4	78·2	4	39·3	29
Wellington (Hug. Sem.) ...	64·7	48·3	56·6	76·0	4	38·3	27
George (Plantation) ...	64·2	48·2	56·2	80·0	4	40·0	27
Uitenhage ...	69·1	44·5	56·8	83·6	19	37·0	29
Cape St. Francis ...	64·9	51·4	58·2	78·0	19	44·0	28
Cape Agulhas ...	61·5	52·1	56·8	72·0	4	45·0	26
Heidelberg ...	64·0	45·5	54·8	79·0	4	38·0	29 & 30
Dunbrody ...	70·7	42·9	56·8	77·3	25	31·2	29
Port Elizabeth ..	66·6	51·6	59·1	73·0	1 & 20	43·0	27
Amalienstein ...	67·0	41·4	24·2	81·0	4	31·0	30
Hanover ...	59·7	36·8	40·2	66·0	3	32·0	2
Murraysburg ...	60·1	37·9	49·0	70·0	19	27·0	28
Kenhardt ...	67·6	35·6	51·6	83·0	19	28·0	28
Kimberley ...	66·7	41·6	54·2	77·0	20	26·7	28
King William's Town ...	69·0	47·1	58·0	84·0	19	36·0	28 & 30
Bedford ...	66·0	43·7	54·8	76·0	21	38·0	18
East London ...	69·1	52·5	60·8	81·0	20	42·0	29
Sydney's Hope ...	63·6	47·1	55·4	76·5	19	38·2	27
Stutterheim ...	64·9	46·4	55·6	77·0	19	37 0	29 & 30
Evelyn Valley ...	60·9	43·7	52·3	74·0	19	46·0	27
Aliwal North ...	62·7	38·0	50·4	76·0	10	25·0	29
Rietfontein (Aliwal North)...	56·9	38·1	47·5	66·2	4	26·0	28
Queenstown ...	64·2	42·5	53·4	74·0	19	30·0	29
Bensonvale Institute ...	57·0	31·0	44·0	66·0	19	20·0	28
Port St. John's ...	72·3	55·1	63·7	81·0	21	42·0	27
Kokstad ...	64·2	39·2	51·7	74·0	19 & 20	25·0	29
Umtata ...	69·2	45·3	57·2	83·0	19	32·0	31
Tabankulu ...	64·8	44·4	54·6	76·8	19	32·0	27
Main ...	65·5	44·3	54·9	76·0	19	35·0	27
Teyatoyaneng ...	57·4	36·5	46·9	67·0	4 & 21	20·0	28
Leribe ...	60·8	37·2	49·0	69·8	20	23·0	27
Kuruman ...	67·8	36·8	52·3	78·0	22	22·0	27 & 28
Hope Fountain ...	75·9	47·0	61·4	81·0	21	38·0	30
Means ...	64·1	44·8	54·4	75·9	...	34·9	..
Extremes ..	...	...	...	84·0	19	20·0	28

RAINFALL, MAY, 1907.

I. CAPE PENINSULA:

	INS.
Royal Observatory (*a*) 12 in. gauge	6·29
Cape Town, Fire Station ...	6·65
Do. South African College	8·66
Do. Molteno Reservoir ...	8·78
Do. Platteklip ...	9·94
Do. Signal Hill ...	5·62
Do. Hospital ...	
Sea Point, The Hall ...	5·82
Do. Attridge ...	6·16
Camp's Bay	6·70
Table Mountain Disa Head ...	7·43
Do. Kasteel Poort ...	16·70
Do. Waai Kopje ..	20·45
Do. St. Michael's ...	18·45
Devil's Peak Blockhouse ...	13·12
Do. Nursery ...	11·18
Do. Lower Gauge ...	
Woodstock, The Hall ...	7·39
Do. Municipal Quarry ...	10·22
Do. do. Nipher's Shield	11·10
Newlands, Montebello ...	16·37
Claremont, Carrigeen ..	12·56
Bishopscourt	15·65
Kenilworth	13·73
Wynberg, St. Mary's ..	11·62
Groot Constantia	11·47
Tokai Plantation	
Plumstead, Culmwood ..	9·02
Muizenburg (St. Res.) ...	
Fish Hoek	
Simon's Town, Wood ...	7·86
Do. Gaol ...	7·06
Cape Point	2·72
B aauwberg Strand	
Robben Island	
Durbanville	
Maitland Cemetery	6·73
Tamboer's Kloof	7·82
Woodhead Tunnel	12·35
Newlands Reservoir, No. 1 ..	17·96
Do. do. No. 2 ..	16·87
Lower Reservoir	9·30

II. SOUTH-WEST:

	INS.
Eerste River	
Klapmuts	8·52
Stellenbosch, Gaol	8·16
Somerset West	7·39
Paarl	8·27
Wellington, Gaol	6·52
Do. Huguenot Seminary	7·00
Groot Drakenstein, Weltevreden	9·42
Porterville Road	4·83
Tulbagh	4·82
Ceres Road	
Kluitjes Kraal	
Ceres	12·67
The Oaks	
Rawsonville	5·56
Caledon	3·33
Worcester, Gaol	2·07
Do. Meiring	
Do. Station	

II. SOUTH-WEST (*con.*):

	INS.
Hex River	3·21
De Doorns	
Karnmelks River	4·16
Lady Grey, Division Robertson .	1·43
Robertson, Gaol	1·51
Do. Govt. Plantation ...	
De Hoop	2·00
Montagu	1·92
Danger Point	5·05
Vygebooms River	7·89
Elgin Plantation	10·32
Elsenburg Agricultural College	7·50
Berg River Hoek ...	
Wemmer's Hoek	
Roskeen	5·05
Vruchtbaar	8·58

III. WEST COAST:

	INS.
Port Nolloth	
Do. Lieut. Barber ...	
Anenous	
Klipfontein	0·52
Kraaifontein	0·42
O'okiep	
Springbokfontein	0·77
Concordia	
Do. Kraphol	0·50
Garies	0·84
Lilyfontein . ..	2·40
Van Rhyn's Dorp	1·86
Clanwilliam, Gaol	2·05
Do. Downes ..	
Dassen Island	3·14
Kersefontein	2·83
The Towers	3·97
Abbotsdale ...	
Malmesbury	4·68
Piquetberg	5·14
Zoutpan	3·16
Wupperthal	2·09
Welbedacht	

IV. SOUTH COAST:

	INS.
Cape Agulhas	4·65
Bredasdorp	3·87
Swellendam	3·21
Potberg	
Zuurbrak	2·99
Grootvaders Bosch	
Heidelberg	2·70
Riversdale	3·05
Melkhoutfontein	
Vogel Vlei	1·70
Geelbek's Vlei	
Mossel Bay	2·00
Great Brak River	1·51
George	2·43
Do. Plantation	2·32
Do. Woodifield	2·46
Ezeljagt	
Millwood	
Sourflats	
Concordia	

IV. SOUTH COAST (con.):

	INS.
Knysna	2·73
Buffel's Nek	4·29
Plettenberg Bay	2·47
Harkerville	2·40
Forest Hall	
Blaauwkrantz	4·53
Lottering	3·37
Storm's River	
Witte Els Bosch	5·05
Humansdorp	5·50
Cape St. Francis	6·36
Hankey	
Witteklip, Sunnyside	
Van Staden's, Intake	5·30
Do. On Hill	4·30
Kruis River	
Uitenhage, Gaol	2·38
Do. Park	2·23
Do. Inggs	2·02
Armadale, Blue Cliff	0·61
Dunbrody	0·81
Port Elizabeth: Harbour	4·85
Do. Victoria Park	
Do, Emerald Hill	7·42
Shark's River, Nursery	5·08
Do. Convict Station	4·72
Tankatara	
Centlivres	1·63

V. SOUTHERN KAROO:

Verkeerde Vlei	
Bok River	
Triangle	
Touws River	
Do. D.E. Office	
Pietermeintjes	
Grootfontein	
Ladismith	0·45
Amalienstein	1·30
Seven Weeks' Poort	
Calitzdorp	0·00
Oudtshoorn	1·17
Vlaakte Plaats	
Uniondale	2·16
Kleinpoort	0·43
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

Matjesfontein	
Laingsburg	
Prince Albert Road	
Fraserburg Road	0·52
Prince Albert	1·16
Zwartberg Pass	1·71
Booi's Kraal, Beaufort West	
Beaufort West, Gaol	1·08
Dunedin	
Nel's Poort	0·91
Camfers Kraal	0·71
Lower Nel's Poort	
Krom River	0·96
Baaken's Rug	
Willowmore	0·86
Rietfontein	
Steytlerville	0·17

VII. EAST-CENTRAL KAROO:

	INS.
Buffels Kloof	
Aberdeen, Gaol	0·39
Do. Bedford	
Corndale	0·52
Aberdeen Road	
Klipplaat	
Winterhoek	
Klipdrift	
Kendrew, Holmes	0·61
Do	0·70
Graaff-Reinet, Gaol	0·83
Do. Eng. Yard	0·69
Do. College	
New Bethesda	0·81
Roodebloem	0·86
Glen Harry	1·44
Wellwood	1·18
Do. Mountain	1·46
Bloemhof	
Jansenville	
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	
Toegedacht	0·20
Klipfontein	0·82
Oranemere	
Pearston	1·47
Darlington	
Walsingham	1·51
Arundale	
Doornbosch, Zwagershoek	
Middlewater	1·51
Somerset East Gaol	1·82
Do. Do. College	
Longhope	
Cookhouse	
Middleton	
Spitzkop, Graaff-Reinet	1·12
Bruintjes Hoogte	1·86
Grobbelaars Kraal	0·43

VIII. NORTHERN KAROO

Calvinia	1·22
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	2·70
Fraserburg	1·22
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	1·36
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	1·25
Victoria West	1·42
Omdraais Vlei	
Doornkuilen	1.56
Britstown	2·20
Wildebeestkooij	1·47
Murraysburg	1·13
De Kruis, Murraysburg	1·09
Richmond	2·32
De Aar	
Middlemount	
Hanover	2·34
Theefontein	1·52

VIII. NORTHERN KAROO (*con.*):	INS.
Zwagersfontein	
Philipstown	1·60
Boschfontein	
Petrusville	1·72
The Willows, Middelburg ...	3·76
Naauwpoort	
Middelburg Gaol	3·58
Do.	2·04
Middelburg Government Farm ...	
Jackalsfontein	3·25
Ezelpoort	2·73
Plaatberg	2·00
Grape Vale	2·27
Ezelfontein	8·80
Roodepoort	3·97
Groenkloof	4·80
Vlakfontein	1·25
Vogelsfontein	2·50
Plaatfontein	1·76
Colesberg	1·41
Tafelberg Hall	2·35
Rietbult, Colesberg Bridge ...	
Fish River	1·99
Varkens Kop	1·04
Culmstock	1·00
Droogefontein	0·96
Stonehills	
Cradock Gaol	1·89
Witmoss	0·85
Varsch Vlei	
Maraisburg	2·16
Steynsburg Gaol	1·09
Riet Vlei...	
Hillmoor...	
Quagga's Kerk	
Tarkastad	1·93
Do., Dis. Engineer ...	2·02
Drummond Park	
Glen Roy	
Waverley	1·29
Gannapan	
Montagu...	1·43
Grape Vale	
Rietfontein, Cradock ...	
Schuilhoek	1·51
Vosburg	0·77
Zwavelfontein	1·63
Holle River, Colesberg ...	2·25
The Meadows, Schoombie ...	0·88
Cradock Station	1·69
Rietfontein	1·38

IX. NORTHERN BORDER.	
Pella	
The Halt	0·02
Keimoes	
Kenhardt	0·73
Upington . ..	0·30
Trooilapspan	0·50
Van Wyk's Vlei	0·46
Prieska	1·50
New Year's Kraal	1·11
Dunmurry	1·33
Karree Kloof	0·90
Griquatown	1·76
Campbell	0·76
Douglas	1·81
Avoca, Herbert	
Hope Town	

IX. NORTHERN BORDER (*con.*):	INS.
Orange River	1·11
Newlands, Barkly West ...	0·55
Barkly West	1·16
Bellsbank	
Kimberley Gaol	0·96
Do. Stephens ...	0·95
Strydenburg	

X. SOUTH EAST:	
Melrose, Div. Bedford ...	1·92
Dagga Boer	1·63
Fairholt	2·63
Lynedoch	2·60
Alicedale	
Cheviot Fells	
Bedford Gaol	2·56
Do. Hall	2·46
Sydney's Hope	4·13
Cullendale	
Adelaide...	1·67
Atherstone	3·04
Alexandria	4·02
Salem	3·04
Fort Fordyce	3·22
Fountain Head	
Graham's Town Gaol ...	3·48
Do. Do.	
Heatherton Towers	1·59
Sunnyside	3·06
Vischgat...	
Fort Beaufort	2·60
Katberg	2·20
Balfour	
Seymour...	3·32
Glencairn	
Alice	4·63
Lovedale...	
Port Alfred	3·13
Hogsback	4·13
Peddie	2·76
Exwell Park	
Keiskamma Hoek	2·22
Cathcart Gaol	1·39
Cathcart, Forman	1·41
Cathcart...	
Thaba N'doda	6·56
Evelyn Valley	8·04
Crawley	1·00
Thomas River	1·65
Perie Forest	2·90
Forestbourne	
Isidenge	3·39
Kologha	2·97
King William's Town Gaol ...	2·10
Do. Do., Dr. Egan	3·25
Stutterheim. Wylde... ...	
Do., Besté	2·11
Fort Cunynghame	2·55
Dohne	
Kubusie	3·00
Quacu	1·46
Blaney	2·15
Kei Road	2·88
Berlin	
Bolo	
Fort Jackson	1·35
Prospect Farm, Komgha ...	1·97
Komgha Gaol	1·84
Chiselhurst	2·81

X. SOUTH EAST (con.):

	INS.
East London West	2·17
East London East	...
Cata	2·87
Wolf Ridge	3·25
Dontsah	3·45
Mount Coke	4·40
Blackwoods	3·06
Albert Vale, near Bedford	2·39
Heatherton Towers Irrigation	1·59
Hurley Farm, Stutterheim	1·90

XI. NORTH-EAST:

Venterstad	0·72
Moolfontein	
Burnley, Cyphergat	
Burghersdorp Gaol	2·05
Ellesmere	1·57
Molteno	1·71
Lyndene	2·32
Cyphergat	1·63
Thibet Park	1·95
Sterkstroom Station	1·14
Do. Gaol	0·82
Rocklands	
Aliwal North Gaol	1·35
Do. Brown	1·54
Do. Dist. Engineer	1·56
Buffelsfontein	...
Hex's Plantation	...
Poplar Grove	...
Carnarvon Farm	0·99
Halseton	...
Jamestown	2·66
Whittlesea	1·45
Queenstown Gaol	1·16
Do. Beswick	1·13
Rietfontein, Aliwal North	2·36
Middlecourt	...
Dordrecht	1·60
Tylden	...
Nooitgedacht	...
Herschel	4·39
Lady Grey	3·49
Lauriston	4·59
Lady Frere	1·11
Contest, near Bolotwa	0·64
Sterkspruit	3·36
Doornkop	...
Avoca, Barkly East	...
Keilands	1·06
Palmietfontein	...
Barkly East	2·48
Blikana	4·26
Glenlyon	...
Rhodes	3·94
Gateshead	...
Cliftonvale	...
Albert Junction	2·17
Queenstown, District Engineer's Office	...
Hughenden	0·98
Glenwallace	1·87
Indwe, District Engineer's Office	1·32
Bensonvale Inst., Herschel	4·15
Cathcart, Queenstown	...
Royal, Div. Albert	...
Dordrecht, D.E's Office	2·05
Stormberg Junction, D.E.	1·98
Broughton, Molteno	3·95

XII. KAFFRARIA:

	INS.
Ida, Xalanga	1·18
Slaate, Xalanga	1·06
Cofimvaba	1·16
Tsomo	1·44
N'qamakwe	2·33
Main	0·91
Engcobo	...
Butterworth	...
Woodcliff	0·83
Kentani	3·50
Maclear	0·99
Idutywa	0·89
Bazeya	2·10
Willowvale	2·41
Mount Fletcher	0·78
Somerville, Tsolo	0·94
Elliotdale	0·83
M'quanduli	...
Matatiele	...
Umtata	1·90
Cwebe	2·24
Tabankulu	2·41
Mount Ayliff	...
Kokstad	1·44
Do., The Willows	1·34
Seteba	0·72
Flagstaff	1·77
Insikeni	0·67
Port St. John's	1·36
Kilrush, Sneezewood	...
Umzimkulu	0·71
Mandileni	...
Wanstead	...
Cedarville	...
Maclear Station	1·05
Elliott Station	1·62

XIII. BASUTOLAND:

Mafeteng	4·56
Mohalies Hoek	...
Maseru	2·38
Teyateyaneng, Berea	2·91
Moyeni Quthing	5·34
Qacha's Nek	2·58
Leribe	2·73
Butha Buthe	...

XIV. ORANGE RIVER COLONY:

Bloemfontein	...
Kroonstad	2·00

XV. NATAL:

Durban, Observatory	0·73

XVI. TRANSVAAL:

Johannesburg	...

XVII. BECHUANALAND:

Taungs	1·69
Vryburg	1·56
Mafeking	...
Setlagoli	1·16
Kuruman	1·55
Zwartlaagte	...
Dry Haarts	1·01

XVIII. RHODESIA:

Hopefountain	0·00
Rhodes Matoppo Park	0·07

XIX. DAMARALAND:

Walfish Bay	...

DEPARTMENTAL NOTICES

Application for the Services of Government Veterinary Surgeons.

The following amended regulations should be observed by the public desirous of obtaining the services of Government Veterinary Surgeons:—

(1) Within the Municipal Areas of Cape Town and Suburbs, Port Elizabeth and Kimberley (where private Veterinary Surgeons are in practice), Government Veterinary Surgeons, except in the case of Government Departments, will attend only to animals suffering or suspected to be suffering from the following contagious and infectious diseases, proclaimed under Section 8, Part II, of Act No. 27 of 1893: Anthrax, African Coast Fever, Epizootic Lymphangitis, Foot and Mouth Disease, Farcy, Glanders, Lungsickness, Rabies, Redwater, Rinderpest, Scabies (in Equines), Sponsziekte (Quarter Evil), Swine Fever, and Tuberculosis.

(2) Within the Municipal Areas of East London, Grahamstown, King Williamstown and Uitenhage (where no private Veterinary Surgeons are in practice), the following uniform tariff of charges for the services of Government Veterinary Surgeons will be levied, except in the case of animals suffering or suspected to be suffering from any of the contagious and infectious diseases mentioned in Clause (1):—

For advice given at Veterinary Surgeon's Office, 2s. 6d. per animal per visit.

For visit to animal in its own quarters, 5s. per animal per visit.

For an operation, 7s. 6d. per animal per visit.

(3) Farmers and owners of stock throughout the Colony frequently telegraph for one of the Government Veterinary Surgeons to be sent to attend to some valuable animal which has been taken seriously ill. It is rarely possible to comply with these requests at once; in the first place, because it is seldom that the Veterinary Officers can be communicated with immediately by telegraph, as they are generally engaged in the country at some distance from a telegraph station; and in the second place, because the only Veterinary Officer who may be at liberty to leave the work upon which he is engaged at the time may be at such a distance from where his services are required that he can hardly be expected to arrive in time to be of any real service in an urgent case. Hence much valuable time is wasted, the owner of the animal is dissatisfied, and the Veterinary Staff discredited. It would be much more satisfactory therefore in all cases in which veterinary advice and assistance are required, if the owner would telegraph to "Veterinus," Cape Town, with prepaid reply, the nature of the complaint that the animal is suffering from, giving as full and accurate a description of the symptoms as possible. This would enable the Chief Veterinary Surgeon to telegraph advice at once, and state whether he were able to arrange for veterinary attendance on the case or not, and thereby save valuable time, which is always of importance in acute and urgent cases.

It must, however, be clearly understood that, as this arrangement is intended purely for the benefit of farmers, the Government cannot accept any responsibility whatever, pecuniary or otherwise, for any loss of stock, etc., which may result from the treatment or advice of any Government Veterinary Surgeon.

Applicants for the services of the Government Veterinary Surgeons must, at their own cost, provide the necessary transport for the conveyance of these Officers from and back to their residence or nearest Railway or Post Cart Station.

N.B.—In no case except of a contagious or infectious nature, as mentioned in Clause (1), should Magistrates wire on behalf of applicants at the public expense.

J. D. Borthwick,
Chief Veterinary Surgeon.

Veterinary Branch,
Department of Agriculture, 26th June, 1907.

Vine Mildew (Plasmopara Viticola).

The following Amended Regulations have been Gazetted, dated July 2, in connection with the above, to take the place of the Regulations previously proclaimed, which are now cancelled and repealed:—

1. No vine or other plant of the family *Vitaceae*, nor any portion or fruit thereof, nor any packing material, box, basket or other receptacle in which any vine or other plant of the family *Vitaceae*, or any portion or fruit thereof, has been carried, shall be removed from the area of this Colony lying East of and including the Divisions of Humansdorp, Uniondale, Willowmore, Aberdeen, Murraysburg, Richmond, Britstown and Prieska, and the territories of Griqualand West and Bechuanaland, to any other portion of this Colony.

2. Any vine or other plant of the family *Vitaceae*, or portion or fruit thereof, removed in contravention of the foregoing Regulation, and any receptacle or covering of such vine or plant, or portion or fruit thereof, shall be confiscated and destroyed.

3. Every person to whose notice it shall come or be brought that any disease has made its appearance in any vine or other plant of the family *Vitaceae*, being his property, or under his care, shall without delay report such appearance to the Resident Magistrate of the District in which such vine or other plant is situated, unless the name and character of such disease are established as not being Grape Mildew or Vine Mildew, due to Plasmopara Viticola.

4. The Secretary for Agriculture may define from time to time localities, within the area described in Regulation 1, which he may have reason to believe to be infected with the said disease; and the owner or person in lawful possession or charge of vines or other plants of the family *Vitaceae* within such defined localities shall spray such vines or other plants, to the satisfaction of the Secretary for Agriculture, with the following preventive preparation, viz.:—2 lbs. bluestone (crystallised sulphate of copper) dissolved in 5 gallons of *cold* water and added to a solution of 2 lbs. freshly slaked lime mixed with 5 gallons of *cold* water, the two solutions to be thoroughly mixed.

5. Any Officer of the Government duly authorised thereto shall have the right to enter any vineyard, garden, orchard, nursery or other premises for the purpose of inspecting any vines or other plants of the family *Vitaceae* growing or suspected of growing therein.

6. All packing material, including straw, paper, cork-dust, baskets, boxes, bags, etc., intended for the conveyance of fruit (not including vegetables) from the area specified in Regulation 1 to any other portion of this Colony, shall, prior to being used for such fruit, be dipped in or sprayed with the preventive preparation prescribed in Regulation 4, and dried.

7. All packing material, including straw, paper, cork-dust, baskets, boxes, bags, etc., intended to be used by *nurserymen* for the conveyance of nursery produce (including trees, plants and vegetables) from the area specified in Regulation 1 to any other portion of this Colony, shall, prior to being used for such nursery produce, also be treated in the manner specified in the preceding Regulation.

8. Every person contravening any of the preceding Regulations or refusing information required by any Government Officer in the performance of his duties under these Regulations, or obstructing him in the execution thereof, shall be liable to a fine not exceeding Twenty-five Pounds Sterling.

DEPARTMENTAL PUBLICATIONS.

The following pamphlets, reprints, etc., are obtainable on application to the Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town. Members of Farmers' and Fruit Growers' Associations applying for same through the Secretaries of these Associations are supplied free of charge.

Agricultural Miscellanea, price 6d. each. Extracts from Vol. I. to V. of *Agricultural Journal.*

Artificial Grasses and Fodder for Stock; Ensilage; Treatment of Cereal and other Crops; Viticulture and Wine Making; Forestry; Locusts and their Destruction; Possible New Industries for Cape Farmers; Dairying; Fruit Culture (6d.).

Agriculture.

Wheat Production in Australia (1s. 6d.) by A. C. Macdonald; *Wheat Production in Australia (1s. 6d.) by W. Halse and J. D. J. Visser ; Hop Cultivation (3d.) translated by A. W. Heywood; *Brak Land in Relation to Irrigation and Drainage (1d.); The Velvet Bean (1d.); Potato Disease (1d.); Scheme of Manurial Experiments (1d.); Leguminous Forage Crops for Trial in Cape Colony (1d.); Sundry Forage Crops for trial in Cape Colony (1d.); Poultry in South Africa: Rearing, Management and Improvement, with notes on Prevalent Diseases and Internal and External Parasites (3d.); The Salt Bushes (1d.); Tobacco Culture by P. Bornemisza (1d.); The Cultivation of Tobacco in the Colony by K. Schenck (3d.); Tobacco Wilt in Kat River Valley (1d.); *The Process and Appliances for the Flue Curing of Tobacco (3d.).

Dairying.

Dairy Breeds by A. C. Macdonald (9d.); *Dairy Industry in Great Britain by A. C. Macdonald (6d.); *Dairy Industry in Denmark (2d.); Ready Reckoner for Cream Testing (1s.); †Dairy and its Products by D. Hutcheon (2d.); *Cheddar Cheese Making (1d.).

Entomology.

The Bont Tick (1d.); Bean Bruchus (1d.); Cabbage Aphis (1d.); Codling Moth in Madeira Fruit (1d.); *Codling Moth (1d.); Fruit Fly (1d.); Fumigation Supplies (1d.); Insect Friends and Foes (1d.); Methods of Locust Destruction (1d.); *Peach Yellows (1d.); Pear Slug, Paris Green (1d.); Remedy for Mestwurmen (1d.); *Spray Calendar (1d.); *Spray Pump Notes (1d.); Scale Insects on Ornamental Trees and Plants (1d.); Two Pine Apple Pests (1d.); Tree Fumigation in California (1d.); Winter Spraying (1d.); Wattle Bag Worm (1d.); Bordeaux Mixture (1d.); Death Head Moth Superstition (1d.); Fumigation under Box Covers (1d.); The House Fly (1d.); New Oak Tree Pest (1d.); Nursery Inspection and Quarantine Bill (1d.); Potato Tuber Moth (1d.); The Codling Moth: Notes on its Life Cycle and Remedies (1d.); Gall Worms in the Roots of Plants (1d.); *The Fruit Fly (with coloured plates), (3d.); Another Introduced Scale Pest (1d.); Washes for Red Scale (1d.); Fruit Fly: Peach Fly Moth (1d.); Lime Salt Wash for Scale Insect (1d.); The Fruit Moth (1d.); Fusicladium of the Apple and Pear (1d.); Mealie Stalk Borer (3d.)—*coloured plate*; Cleaning up Nursery (1d.); Natural Enemies of the Fruit Fly: Report on Investigations in Brazil (1d.); Locust Birds and Locust Poison (1d.); The Brazil Fruit Fly Parasites (1d.); Cyanide Gas Remedy for Scale Insects (3d.); Arsenate of Lead (1d.); The Antestia Fruit Bug (1d.); Caterpillars Destroying Trees (1d.).

Forestry.

British National Forestry (1d.); Botanical Observations on Forests in Eastern Pondoland (1d.); †Elementary Principles of Sylviculture or Woodcraft (1d.); National Forests (1d.); Indigenous Timbers of the Cape (1d.); Misuse of Coal and the Uses of Forests (1d.); Tree Planting for Timber and Fuel (1d.); Tree Planting for Farmers (1d.).

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

Fisheries.

Trout and Carp Breeding and Stocking of Streams (1d.); *Methods of Preserving Fish by Smoking (1d.); Portable Floating Hatching Box for Trout Ova (1d.); The Protection of Trout (1d.); The Ocean and its Resources (1d.).

Horticulture.

Fruit Culture in the Gamtoos River Valley (1d.); *Marketing of Fruit (1d.); The Olive at the Cape (2d.); Tomatoes and Fruit for Export (1d.); Citrus Culture in Cape Colony: Report of the Citrus Commission (1d.); *Fruit from Orchard to Buyer (1d.); Netting for Fruit Trees (1d.); Fruit Culture in Argentina (1d.); Vegetables for Exhibition (1d.); Chrysanthemum Rust (1d.).

Veterinary and Animal Industry.

*Anthrax, Charbon, Mitzbrand or Miltziekte (1d.); *Heartwater (1d.); *Malarial Catarrhal Fever of Sheep (1d.); Rinderpest: Dr. Koch's Report (1d.); *Inoculation against Rinderpest (1d.); Dr. Kohlstock's Report on Inoculation for Rinderpest (1d.); *Redwater, Texas Fever or Tick Disease (1d.); *Redwater, Anthrax and Quarter Evil (1d.); *Sheep and Wool (1d.); The Eye and its Diseases (1d.); Husk, Hoose or Parasitic Disease of the Lungs of Cattle, Sheep and Pigs (1d.); Tick Heartwater Experiments (1d.); Indigestion and Diarrhœa in Calves (1d.); Persian Sheep and Heartwater (1d.); Poisoning of Stock (1d.); Retention of the Fœtal Membrane, or Afterbirth in Cows (1d.); Stijfziekte, Lamziekte or Osteo-Malacia and Paralysis (1d.); Tuberculosis and the Use of Tuberculin (1d.); African Coast Fever, with Description of Dipping Tank (3d.); *Rinderpest in South Africa (3d.) by D. Hutcheon; *Fluke or Slak in Liver of Sheep (3d.)—*coloured plate*; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte (1d.); Osteo Porosis (3d.)—*coloured plates*; *Glanders (3d.)—*coloured plate*; *Animal Castration (1d.); *Preventive Inoculation for Redwater (1d.); *Abortion in Cattle (1d.); Treatment for Worms in Domestic Animals (1d.); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia or Pleuro-Pneumonia-Bovum-Contagiosa (1d.); *Swine Fever, Hog Cholera or Pig Typhoid (3d.)—*coloured plates*; Castration of Females and Animals other than the Horse (1d.); Poisoning of Horses by *Ornithogalum Thyrsoides* or Chinkerinchee (*coloured plate*) (3d.); Horse Sickness by D. Hutcheon (2d.); Ticks and African Coast Fever (1d.); Cirrhosis of the Liver in Stock (1d.); Liver Disease among Calves (3d.); The Arsenite of Soda Dipping Mixture (1d.); *Lampas; Preventive Vaccination against Anthrax.

Viticulture.

†Reports on Viticulture (3d.); *Reconstitution of Phylloxerised Vineyards (1s.); Report on Failure of Hanepoot Grapes on American Vines (1d.); The Making of Wine and its By-Products (6d.); How to Treat Wine Casks (1d.); Failure of Vines (1d.); Manufacture of Dry Wines in Hot Countries (3d.); Anthracnose in Constantia (1d.).

Miscellaneous.

Game Seasons (3d.); Land Laws of Cape Colony (1d.); †Monsonia. the Cape Cure for Dysentery (1d.); *Rainfall in South Africa (1d.); Sand Dunes of Gascony (5d.); The Metric System (1d.); South African Stud Book Constitution, Rules, etc. (1d.); Bars in Ostrich Feathers (1d.); *Information regarding the Mining Laws (1s.); The Preservation of Game in Cape Colony.

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 22nd June, 1907, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L Beef per lb.	M Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	s d	s d	£ s d	s d		
Aliwal North ..	0 8 0	0 17 6	0 12 6	0 7 9	0 4 6	0 6 0	0 6 0	0 7 6	0 3 0	1/6 to 2/-	0 6	0 6	0 1 3	2 6	£7 to £9	14 - to 19 -
Beaufort West ..	0 9 6	0 15 6	0 12 0	0 8 6	0 10 6	0 9 3	0 9 0	0 6 0	0 8 0	0 0 10	6d, 1 -	6d, 7d	0 1 7	2 6	£15.	22/-
Burghersdorp ..	..	..	..	0 4 6	..	..	..	0 6 0	0 4 6	0 0 7	0 6½	0 5½	0 1 3	1 9	..	..
Cape Town ..	..	..	..	..	..	7 to 7 6	7 - to 7 3	4 10 to	3 8 4	..	..	..	0 1 2	1 9	..	..
Clanwilliam ..	11 - to 12 -	..	12 - to 13 -	.	..	0 8 0	8 - to 10 -	5 -	0 8 0	0 1 0	7d to 8d	6d to 8d	0 1 6	1 3	..	..
Colesberg ..	..	..	..	11 1 to 11 3	..	..	..	6d per bundle	4 6 to 7 -	..	..	..	8d to 1 -	1/6 to 2 -	..	..
Cradock ..	0 7 6	..	1 1 6	..	0 7 6	0 6 0	..	0 6 4	0 5 0	0 0 6	..	0 5	0 1 3	2 0	£11	17/-
Dordrecht..	0 7 0	0 13 0	0 10 0	0 4 0	0 7 0	0 4 0	0 5 0	0 3 0	0 4 0	0 1 0	0 6½	0 5	0 1 4	1 4	£10	16/-
East London ..	0 7 0	0 10 6	0 9 6	0 6 0	0 7 8	0 5 6	0 4 8	0 4 3	0 7 6	0 1 6	†7d & *6d	†*0 7	0 1 9	2 0	£20	46/-
Graaff-Reinet ..	0 8 0	..	0 10 0	0 7 0	..	0 5 0	..	0 4 6	0 5 0	..	0 6	0 6	0 1 3	2 0	£12	20/-
Graham's Town ..	0 6 3	..	..	0 5 6	..	0 4 3	0 6 3	0 5 3	0 10 6	0 0 6	0 7	0 7	0 2 0½	2 2½	..	..
Kimberley ..	0 10 0	0 15 0	0 12 6	0 5 9	0 7 0	0 7 6	0 8 6	0 6 9	0 17 0	0 0 7½	0 10	0 8	0 1 4	1 9	£8 10/- to £13.	18/- to 20/-
King Wm.'s Town..	0 6 6	0 14 0	0 12 0	0 5 0	0 7 0	0 4 6	0 7 0	0 3 6	0 6 0	0 0 4	0 10	0 10	0 1 9	1 6	£14	24/-
Malmesbury ..	0 8 6	0 14 0	0 10 6	0 8 0	0 7 9	0 7 6	0 6 0	0 4 0	0 13 0	0 1 0	0 6	..	0 1 6	1 6	£14	£1 5/-
Mossel Bay ..	..	0 13 6	..	0 6 0	..	0 5 6	0 7 0	..	0 15 6	0 0 8	..	0 8	0 1 9	1 9	..	..
Port Alfred ..	0 8 6	0 15 0	0 14 0	0 5 0	0 10 0	0 5 0	0 6 0	0 4 6	0 10 0	0 0 6	0 9	0 10	0 2 6	1 3	..	..
Port Elizabeth ..	0 7 6	..	..	0 6 3	..	0 4 6	0 6 6	0 4 9	0 12 0	0 0 4	0 7½	0 7½	0 1 5	1 10	..	..
Queen's Town ..	0 5 0	0 9 6	0 5 0	0 4 6	0 4 0	0 4 6	0 5 6	0 4 3	0 5 0	0 1 0	*0 6	*0 6½	0 1 4	1 9	£12 to £15	21/- to 28/-
Tarkastad..	0 12 0	0 13 0	0 12 0	0 7 6	0 9 6	0 5 6	0 10 0	0 6 0	0 5 0	0 1 0	*0 5	*0 5	0 0 7	1 3	£10	20 -
Vryburg ..	..	0 17 6	..	..	..	0 11 0	0 11 0	..	0 10 0	0 0 8	..	..	..	..	..	..
Worcester ..	0 9 0	0 13 6	0 10 3	0 6 6	0 7 6	0 7 0	0 7 0	0 4 9	0 7 0	0 0 6	*6d to 10d †5d to 9d	*6d to 7d †5½d to 6½d	0 1 9	2 0	£9 to £15	22/6 to 24/6

NOTE.—A blank space denotes 'no transactions." *Colonial. †Imported.

THE PRODUCE MARKET.

CAPE TOWN.

Mr. R. Müller, of Strand Street, Cape Town, reports for the month ending June 30th :—

Ostrich Feathers.—At the opening of the London Sales, held last month, Superior Whites suffered a rather serious decline, other classes of Wings remained unchanged. Blacks and Drabs were firmer. When the Sales closed, Wings generally were weaker, except Dark Feminas and Byocks. Locally, business has been done in sympathy with this news.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Super Primes	17 10 0	35 0 0	Floss	0 5 0	1 10 0
Firsts, ordinary to Super	11 0 0	14 10 0	Long Drabs	2 10 0	4 0 0
Seconds	8 0 0	9 10 0	Medium Drabs	1 5 0	2 0 0
Thirds	6 0 0	7 10 0	Short to Medium	0 10 0	1 15 0
Femina Super	12 0 0	16 0 0	Floss	0 2 6	1 10 0
Femina, Seconds to Firsts	5 10 0	10 10 0	White Tails	1 15 0	3 15 0
Byocks (fancy)	5 10 0	9 10 0	Coloured Tails	0 10 0	2 10 0
Long Blacks	3 10 0	7 10 0	Chicks	0 1 0	0 2 0
Medium Blacks	2 0 0	3 0 0	Spadonas	2 10 0	5 0 0
Short to Medium	0 10 0	2 10 0	Interior Black and Drabs, short to long	0 0 6	1 10 0

Wool.—The Wool Market has undergone little change since my last report. A good demand still continues for good quality light grease; heavy and wasty lots, however, remain difficult of sale. The latest mail reports from London show that Cape Wools on the whole showed a fairly satisfactory character, the highest price obtained being 13½d. for a clip of superior light grease, while the majority ranged from 8d. to 10d. per lb. Good quality Grease and Snow-whites remained unchanged, while common qualities were 5 per cent. lower. Super Western Snow-whites fetched up to 2s 2d. per lb.

	s. d.	s. d.		s. d.	s. d.
Super long Grass Veld	0 8	0 10	Snow-white, Super to Extra	1 7	1 10
Do. Karoo	0 6¾	0 8	Do. Ordinary	1 1	1 6
Medium	0 5	0 6	Fleece, washed	0 0	0 10
Short and Inferior	0 4	0 4½			
Wool for washing	0 4½	0 6			

Mohair.—The Market remains steady, and a fair amount of business has been done. Mail advices report a serious state of affairs in Asia Minor, where owing to an unprecedentedly heavy winter, terrible losses of Angora Goats have taken place, which, it is said, will take years to recover from. In some districts 70 per cent. of the goats have been killed. This should be an incentive to our farmers to pay increased attention to the Angora Goat industry.

	s. d.	s. d.		s. d.	s. d.
Firsts, Summer	1 1½	1 2½	Winter	0 10½	0 11½
Kids	1 4	1 8	Do. Kids	1 1	1 2
Seconds	0 6½	0 10			

Hides and Skins.—At the London Goat Skins Sales held last month these skins showed rather a decline; other classes remained unchanged.

PORT ELIZABETH.

Messrs. John Daverin & Co. report under date June 28th :—

Ostrich Feathers.—We have again to report a full three and a half days' sale. On Monday and Tuesday the quality of the offerings was very indifferent, consequently the market was weak and irregular; the supply on Wednesday, however, was rather better with the result that prices showed some improvement, and to-day the quality of the offerings being much above the usual standard active competition prevailed, all descriptions realising very satisfactory prices. There have also been several sales made out of hand at advanced prices. The total value of feathers sold on the Municipal Sales this week amounted to £15,661 7s. 10d., and weighed 6,299 lbs. 0 ozs.

	£	s.	d.	£	s.	d.
Primes : Extra super		Special Prices.				
Good to super	15	0	0	20	0	0
Whites : Firsts .	11	0	0	15	0	0
Seconds ..	7	0	0	10	0	0
Thirds	2	10	0	6	10	0
Feminas :						
Super	11	0	0	16	0	0
Firsts	8	0	0	10	0	0
Seconds	4	10	0	7	0	0
Thirds .	2	10	0	3	10	0
Greys	4	10	0	8	0	0
Fancy .	5	10	0	9	0	0
Tails : White	1	10	0	3	15	0
Light .	1	5	0	3	0	0

	£	s.	d.	£	s.	d.
Coloured & Dark	0	5	0	1	2	6
Blacks : Long .	3	10	0	5	10	0
Medium	1	5	0	2	10	0
Short	0	10	0	1	0	0
Wirey	0	1	0	0	1	0
Floss	0	6	0	1	5	0
Drabs : Long ..	1	10	0	4	0	0
Medium .	0	12	6	1	0	0
Short	0	2	6	0	6	0
Wirey	0	0	6	0	1	0
Floss	0	6	0	1	5	0
Spadonas . Light	1	15	0	5	0	0
Dark . ..	0	10	0	2	10	0
Chicks . ..	0	0	3	0	2	6

Wool Nothing new can be reported of this market, which remains steady, but owing to small stocks and little arriving, the amount of business done in the open market has been very limited. On the public market yesterday a small quantity was offered, and competition being active for all light lots extreme prices were realised.

Snowwhite, Extra Superior ...	20d to 21½d
Do. Superior	18d „ 20d
Do. Good to Superior...	16½d „ 17½d
Do. Inferior Faulty ...	16d „ 16½d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	9½d „ 10d
Do. do. do. ...	8d „ 9d
Do. do. Karoo grown (special clips)	7½d .. 8d
Do. do. do. ...	6½d „ 7d
Do. do. Mixed Veldt...	5¾d „ 7d
Do. Light, faultless, medium Grassveldt grown ...	6½d .. 7¼d
Do. do. Karoo grown	6d „ 6¼d
Do. do. short, do	5½d „ 5¾d
Do. short, faulty and wasty	6¼d to 7d
Grease, Coarse and Coloured .	4¼d to 4½d
Scoured do. do. ...	6½d „ 12d
Basuto Grease, short	6½d .. 7d
O.R.C. Grassveldt Grease, long long & well-conditioned (special clips)	7½d .. 8d
Do. do. do. ...	6½d „ 7¼d
Do. do. medium grown, light, with little fault	6d „ 6½d
Do. do. short, faulty & wasty	5d „ 5¼d
Do. do. Karoo grown, long & well-conditioned ...	6¼d „ 6¾d
Do. do. medium grown, light with little fault ...	5d „ 6d
Do. do. short, faulty and wasty...	4½d „ 5d

Mohair.—This market has been rather quiet during the week, and the only sales of importance were 210 bales Summer Kids, 195 bales Summer Firsts, and 60 bales mixed. Although the amount of business done has been limited, the tone of the market continues healthy, and we look for a continuance of present prices. On the public market on Tuesday a fairly large quantity was offered, prices showing little or no change.

Super Kids	17½d to 17¾d
Ordinary Kids	16d „ 17d
Superior Firsts, special clips (nominal)	14d „ 14½d
Ordinary Firsts...	13½d „ 14d
Short Firsts	12½d „ 13d
Superfine Long Blue O.R.C. Hair, nominal	14d „ 14½d
Mixed O.R.C. Hair (average)	11d to 11½d
Do. very mixed ...	10d „ 10½d
Seconds and Grey	8d „ 9d
Winter Kids, special clips ...	14½d
Thirds	6d „ 6d
Do. good ordinary ...	13d „ 14d
Winter Hair	11d „ 11½d

Skins.—Sheepskins sold this week in bundles at 7½d. per lb.; Pelts, 6d.; Capes, 1s. 11d. each; damaged, 6d. each; Goat, 12¼d.; damaged, 6¼d. per lb.; Angoras, 9¾d.; Shorn, 7d.; damaged, 4½d. per lb.

Hides.—Sundried sold at 9d., damaged, 6d. per lb.; Dry-salted, 7¾d.; damaged, 5¼d. per lb.; Madagascar hides, 7d.; damaged, 5½d. per lb.; Thirds, 3½d. per lb.

G

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for **2s. 6d.**, (minimum charge) per insertion, and **6d.** per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY, 125-127, Long Street, Cape Town, to whom all communications should be addressed.

CATTLE.

JERSEYS.—Thoroughbred Herd Celebrated Island bred bull "Clove," and several of the best cows and heifers from Mr. H. W. Struben's late herd. Mrs. A. A. Dunn, De Tuin, Piquetberg.

Thoroughbred pedigree **JERSEY BULLS** for sale, from Imported or Colonial bred prize stock, good milking strain. For particulars, apply to SUPERINTENDENT. Porter Reformatory, Tokai. P O., Retreat.

PURE FRIESLANDS. Enquire for cows, young bulls, and heifers. Oldest pure herd in Eastern Province. Grand milkers. Prize stock. Also, Colonial Rambouillet Flock Rams, limited number.—F. F. WIENAND, Bellevue, Bedford, C.C.

R. Cross, HILLSIDE P O BOLOTWA. Has high-class Friesland bulls for sale. Herd may be seen by appointment. Bulls from Imported and Colonial Cows.

SHEEP.

Pringle Bros. RAMBOUILLET MERINO RAMS. Sold only at the Bedford Ram Breeders' Fairs at dates published. PRINGLE BROS., Glen Thorn, P.O., Linton, Adelaide.

R. Pell Edmonds, RIPPLEMEAD, DOHNE, Breeder of Pure-bred **PEDIGREE MERINO SHEEP** and **PEDIGREE BLACK WELSH CATTLE.**—For particulars see page xxxiii.

HORSES, &c.

For Sale.—Imported **CLEVELAND STALLION**: sire, Pitch & Toss, 3 years champion in succession; foaled 1897. Royal Horse Show Prize Winner. Quiet to ride and drive: tried at stud. A bargain. W. J. WALSH, Klein River Estate, P.O., Stanford, Caledon, C.C.

CATALONIAN JACKS.—Pure Catalonian Yearling Jacks from thorough-bred Imported Sire and Catalonia Jennies imported from Mexico, for Sale. MATABELE THOMPSON, Carnforth Hill Estate, Post Bag, Klipdam.

PIGS.

BERKSHIRE PIGS thorough-bred, pedigree boars and sows, from Imported stock, winners of numerous prizes. For particulars, apply to SUPERINTENDENT, Porter Reformatory, Tokai, P.O, Retreat.

For Sale.—A few young boars from Imported Ohio Poland China stock. Farrowed July 1906 and March 1907. For price and particulars, apply J. T. HINDE, Far, Goedgevonden, Ceres Road.

OSTRICHES.

Specials only. Chicks, £5 to £20 each: Young Birds, £10 to £30.—F. W. BAKER, Laughing Waters, Willowmore.

GENERAL.

H. Vermaak, THE PINES, MARAISBURG, CAPE COLONY, has on hand and for sale at very reasonable prices, **PURE-BRED FRIESLAND BULLS** and **PURE-BRED MERINO RAMS** of the **RAMBOUILLET** breed.

THOROUGH-BRED PERSIAN RAMS and **OSTRICHES.**—HOUGHAM ABRAHAMSON, LONG HOPE SIDING, C.C. Breeder of Rams from progeny of ewes passed into Stud Book of Cape Breeders' Association. Also selected Breeding Ostriches.

PASPALUM GRASS PLANTS. Quotations for plants, in bags free on rail Stellenbosch (keep moist long distance). See *Agricultural Journal*, May, 1906, page 622, or from A. C. BULLER, Dwarsriviershoek, Stellenbosch.

PURE BRED ANGORA GOAT RAMS.—Bred from the Choicest Strains, and Prize-winners at the leading Agricultural Shows of Cape Colony. For particulars apply to A. B. HOBSON, Matyrsford, Jansenville.

PERSIAN SHEEP and OSTRICHES.—**S. Montague Gadd,** SPRINGFIELD, TAFELBERG. Orders booked for young rams, from Stud Book Ewes and for Ostrich Chicks from the best strains in the country.

THE POULTRY YARD.

A RARE OPPORTUNITY.—**For Sale.**—Pens from the Laying Competition. My birds being all good layers, am able to offer following as returned from competition:—

Pen 7. Barred Rocks (3 hens), total 565 eggs
„ 19. Brown Leghorns (4 hens), total 515 eggs.
„ 24 Barred Rocks (3 hens), total 419 eggs.

Price 20/- each bird, to take pen. Cockerels mated at same rate. Surplus cockerels, White Wyandottes, Brown and Buff Leghorns. Price 15/- each. White Leghorns, 20/- each on rail S. SMITH, Talana, Wellington Avenue, Wynberg.

BUFF ORPINGTONS.—THE FARMER'S FOWL. The fowl that LAYS WHEN EGGS ARE TOP PRICE and are also A 1 table birds. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices Ask for inclusive quotations; carriage paid to any station in South Africa and AT MY RISK to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 9 years' standing CAN HOLD ITS OWN AGAINST IMPORTED STOCK. Buy hardy Colonial-bred birds and save your pocket. Eggs from pure-bred utility strain, 12/6. Address: A. C. BULLER, Dwarsriviershoek, Stellenbosch.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Croydon House, Faure, C.C.

TURKEYS.—MAMMOTH AMERICAN BRONZE.—HARDY STRAIN OF GREAT SIZE. Noted prize winners. Young stock for sale after April. Orders booked now. Ask for inclusive quotations. Carriage paid to any station in South Africa and AT MY RISK to rail destination. Eggs in season. Full particulars from A C. BULLER, Dwarsriviershoek, Stellenbosch.

PORT ELIZABETH.

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	£	s.	d.	£	s.	d.
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Seconds .	7	0	0	10	0	0
Thirds .	2	10	0	6	10	0
Feminas:						
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Firsts	8	0	0	10	0	0
Seconds	4	10	0	7	0	0
Thirds	2	10	0	3	10	0
Greys	4	10	0	8	0	0
Fancy	5	10	0	9	0	0
Tails: White .	1	10	0	3	15	0
Light	1	5	0	3	0	0

	£	s.	d.	£	s.	d.
Coloured & Dark	0	5	0	1	2	6
Blacks: Long .	3	10	0	5	10	0
Medium	1	5	0	2	10	0
Short	0	10	0	1	0	0
Wirey	0	1	0	0	1	0
Floss	0	6	0	1	5	0
Drabs: Long .	1	10	0	4	0	0
Medium	0	12	6	1	0	0
Short	0	2	6	0	6	0
Wirey	0	0	6	0	1	0
Floss	0	6	0	1	5	0
Spadonas. Light	1	15	0	5	0	0
Dark	0	10	0	2	10	0
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Do. do. do. ...	6½d „ 7d
Do. do. Mixed Veldt...	5¾d „ 7d
Do. Light, faultless, medium Grassveldt grown ..	6½d „ 7¼d
Do do. Karoo grown	6d „ 6¼d
Do. do. short, do	5½d „ 5¾d
Do. short, faulty and wasty	6¼d to 7d
Grease, Coarse and Coloured .	4¼d to 4½d
Scoured do. do. ...	6½d „ 12d
Basuto Grease, short	6½d „ 7d
O.R.C. Grassveldt Grease, long long & well-conditioned (special clips)	7½d „ 8d
Do. do. do. ...	6½d „ 7¼d
Do. do. medium grown, light, with little fault	6d „ 6½d
Do. do. short, faulty & wasty	5d „ 5¼d
Do. do. Karoo grown, long & well-conditioned ...	6¼d „ 6¾d
Do. do. medium grown, light with little fault ...	5d „ 6d
Do. do. short, faulty and wasty	4½d „ 5d

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Short Firsts	12½d „ 13d
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Mixed O.R.C. Hair (average)	11d to 11½d
Do. very mixed ...	10d „ 10½d
Seconds and Grey	8d „ 9d
Winter Kids, special clips ...	14½d
Thirds	6d „ 6d
Do. good ordinary ...	13d „ 14d
Winter Hair	11d „ 11½d

Skins.—Sheepskins sold this week in bundles at 7⅛d. per lb.; Pelts, 6d.; Capes, 1s. 11d. each; damaged, 6d. each; Go[illegible] 12¼d.; damaged, 6¼d. per lb.; Angoras, 9⅜d.; Shorn, 7d.; damaged, 4½d. per lb.

Hides.—Sundried sold at 9d., damaged, 6d. per lb.; Dry-salted, 7¾d.; damaged, 5¼d. per lb.; Madagascar hides, 7d.; damaged, 5½d. per lb.; Thirds, 3½d. per lb.

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for **2s. 6d.**, (minimum charge) per insertion, and **6d.** per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY, 125-127, Long Street, Cape Town, to whom all communications should be addressed.

CATTLE.

JERSEYS. Thoroughbred Herd. Celebrated Island bred bull "Clove," and several of the best cows and heifers from Mr. H. W. Struben's late herd. Mrs. A. A. Dunn, De Tuin, Piquetberg.

Thoroughbred pedigree **JERSEY BULLS** for sale, from Imported or Colonial bred prize stock, good milking strain. For particulars, apply to SUPERINTENDENT. Porter Reformatory, Tokai. P O., Retreat.

PURE FRIESLANDS.—Enquire for cows, young bulls, and heifers. Oldest pure herd in Eastern Province. Grand milkers. Prize stock. Also, Colonial Rambouillet Flock Rams, limited number. F. F. WIENAND, Bellevue, Bedford, C.C.

R. Cross, HILLSIDE, P.O. BOLOTWA. Has high-class Friesland bulls for sale. Herd may be seen by appointment. Bulls from Imported and Colonial Cows.

SHEEP.

Pringle Bros. RAMBOUILLET MERINO RAMS. Sold only at the Bedford Ram Breeders' Fairs at dates published. PRINGLE BROS., Glen Thorn, P.O., Linton. Adelaide.

R. Pell Edmonds, RIPPLEMEAD, DOHNE. Breeder of Pure-bred **PEDIGREE MERINO SHEEP** and **PEDIGREE BLACK WELSH CATTLE.**—For particulars see page xxxiii.

HORSES, &c.

For Sale. Imported **CLEVELAND STALLION**: sire, Pitch & Toss, 3 years champion in succession; foaled 1897. Royal Horse Show Prize Winner. Quiet to ride and drive: tried at stud. A bargain. W. J. WALSH, Klein River Estate. P.O., Stanford, Caledon, C.C.

CATALONIAN JACKS.—Pure Catalonian yearling Jacks from thorough-bred Imported Sire and Catalonia Jennies imported from Mexico, for Sale - MATABELE THOMPSON, Carnforth Hill Estate, Post Bag, Klipdam.

PIGS.

BERKSHIRE PIGS thorough-bred, pedigree boars and sows, from Imported stock, winners of numerous prizes. For particulars, apply to SUPERINTENDENT, Porter Reformatory, Tokai, P.O, Retreat.

For Sale.—A few young boars from Imported Ohio Poland China stock. Farrowed July 1906 and March 1907. For price and particulars, apply J. T. HINDE, Far, Goedgevonden, Ceres Road.

OSTRICHES.

Specials only.—Chicks, £5 to £20 each: Young Birds, £10 to £30.—F. W. BAKER, Laughing Waters, Willowmore.

GENERAL.

H. Vermaak, THE PINES, MARAISBURG, CAPE COLONY, has on hand and for sale at very reasonable prices, **PURE-BRED FRIESLAND BULLS** and **PURE-BRED MERINO RAMS** of the **RAMBOUILLET** breed.

THOROUGH-BRED PERSIAN RAMS and **OSTRICHES.**—HOUGHAM ABRAHAMSON, LONG HOPE SIDING, C.C. Breeder of Rams from progeny of ewes passed into Stud Book of Cape Breeders' Association. Also selected Breeding Ostriches.

PASPALUM GRASS PLANTS.—Quotations for plants, in bags free on rail Stellenbosch (keep moist long distance). See *Agricultural Journal*, May, 1906, page 622, or from A. C. BULLER, Dwarsrivierhoek, Stellenbosch.

PURE BRED ANGORA GOAT RAMS.—Bred from the Choicest Strains, and Prize-winners at the leading Agricultural Shows of Cape Colony. For particulars apply to A. B. HOBSON, Matyrsford, Jansenville.

PERSIAN SHEEP and OSTRICHES.—**S. Montague Gadd,** SPRINGFIELD, TAFELBERG. Orders booked for young rams, from Stud Book Ewes and for Ostrich Chicks from the best strains in the country.

THE POULTRY YARD.

A RARE OPPORTUNITY.—For Sale.—Pens from the Laying Competition. My birds being all good layers, am able to offer following as returned from competition:—

Pen 7. Barred Rocks (3 hens), total 565 eggs.
„ 19. Brown Leghorns (4 hens), total 515 eggs
„ 24. Barred Rocks (3 hens), total 419 eggs.

Price 20/- each bird, to take pen. Cockerels mated at same rate. Surplus cockerels, White Wyandottes, Brown and Buff Leghorns. Price 15/- each. White Leghorns, 20/- each on rail S. SMITH, Talana, Wellington Avenue, Wynberg.

BUFF ORPINGTONS. THE FARMER'S FOWL. The fowl that LAYS WHEN EGGS ARE TOP PRICE and are also A 1 table birds. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices Ask for inclusive quotations; carriage paid to any station in South Africa and AT MY RISK to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 9 years' standing CAN HOLD ITS OWN AGAINST IMPORTED STOCK. Buy hardy Colonial-bred birds and save your pocket. Eggs from pure-bred utility strain, 12/6. Address: A. C. BULLER, Dwarsrivierhoek, Stellenbosch.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Croydon House, Faure, C.C.

TURKEYS. MAMMOTH AMERICAN BRONZE.—HARDY STRAIN OF GREAT SIZE. Noted prize winners. Young stock for sale after April. Orders booked now. Ask for inclusive quotations. Carriage paid to any station in South Africa and AT MY RISK to rail destination. Eggs in season. Full particulars from A C. BULLER, Dwarsrivierhoek, Stellenbosch.

THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 2. AUGUST, 1907. VOL. XXXI.

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The Editor "Agricultural Journal," Department of Agriculture, Cape Town.

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CONTENTS.

NOTES.

Index—Vol. XXX.—January to June, 1907.

With the current issue the Index for Vol. XXX of the *Agricultural Journal*—viz., the period from January to June of this year—is enclosed. Thus those of our readers who file their Journals will now be in a position to have them bound for future reference. We may mention that if this system were more generally followed, farmers and others interested would be able to look up information for themselves at a moment's notice, which they would find of great service in an emergency.

The Free List.

The list of farmers who receive the *Agricultural Journal* free of charge has now grown to such dimensions that we feel we can with confidence ask all interested to assist us as far as possible in keeping it in order. It frequently happens that someone on the list removes, gives up farming, or, through other causes, ceases to become entitled to the free issue. In such cases it will help the publishers very much if those aware of such changes would notify the Editor. In most cases it is only necessary to return the Journal through the post unopened, merely writing on the outside the reason for doing so, such as "Left the District," or "Unknown," or "Dead," as the case may be. Either will be sufficient warrant to remove such names from the list.

Duplicate Copies.

We have to thank those on the Free List who have so kindly responded to our request to return duplicate copies which may have been sent in error. And in doing so would again ask anyone in receipt of more than one copy to please return one, merely handing it back to the post, unopened, marking on the wrapper, "Duplicate—Returned." Some names are still being sent in from more than one source, and even with the most careful scrutiny it is manifestly impossible in a country where names, initials, and even addresses are so similar to be always certain as to the individuality of each applicant. Every effort is now made to bring the *Agricultural Journal* to the farmer free of charge, and we trust the farmers sufficiently appreciate the benefits to try and help us in such a small matter as this.

Re-opening of Cape Town Feather Market.

The Corporation announces the re-opening of the Municipal Produce Market in Dock Road, Cape Town, for the disposal by auction of ostrich feathers and general produce. Mr. W. H. Dunkley has been appointed Market Master. A particular feature is to be made of the feather sales, and the buyers have promised to give it support. As producers can thus rely upon getting the best prices, they are requested to do their best to assist in re-establishing the system. Open markets are badly wanted all through this Colony, and it is to the interests of producers to support them wherever they can. The sales are conducted by catalogue.

Railway Rebate on Oil used as Fuel for Irrigation Purposes.

Among the Departmental Notices in the current issue will be found an important announcement by the Public Works Department with reference to the rail freightage on paraffin oil to be used as fuel for engines operated in connection with irrigation work. (1) Any oil, crude or refined, will be carried at the third class rate provided the proper declaration is filed. (2) A rebate of one half the rate originally paid will subsequently be made on presentation of the proper certificate—form of which is given in the notice published. All consignments will be carried at owner's risk. The following figures indicate how the cost of a consignment will work out upon an assumed distance of 500 miles.

COST OF CARRIAGE OF PARAFFIN AT NORMAL AND REDUCED RATES FOR IRRIGATION PURPOSES FOR A DISTANCE OF 500 MILES.

	At normal 2nd Class Rate (owner's risk) including cartage charges.	At 3rd Class Rate (owner's risk) including cartage charges.	At special reduced Rate for Irrigation at half of 3rd Class Rate.
Per ton	£8 8 4	£3 15 0	£1 18 4
Per case of reputed 82 lbs. weight	6 11	3 1	1 7
Approximate charge per gallon	10	4½	2¼

Water Boring under Government Subsidy: Approval essential before commencement of work.

We have been requested to invite the careful attention of all farmers to Clause No. 2 of the Regulations contained in Government Notice No. 1084 of 1905, viz.:—

> "All Agreements must be formally approved by the Government, "*before work is commenced. Subsidy will not be paid in respect* "*to Contracts not thus approved.*"

It appears that notwithstanding the wide publicity given to the terms of the Regulations, cases have occurred where contractors have commenced work before the approval of the Public Works Department has been obtained, and applicants have consequently been disappointed in not securing the Government subsidy. Farmers are therefore requested to make a special point of seeing that the contract has been formally approved by the Government before work is commenced. The full text of the Regulations is republished in this issue for general information, among the Departmental Notices.

Natal and Codlin Moth.

In order to prevent the introduction of "Codlin Moth" into Natal, the Government of that Colony has prohibited the importation of all apples, pears or quinces from any portion of this Colony with the exception of the ports of East London and Port Elizabeth. Should any consignments of the fruit above-mentioned, forwarded from these ports, be found to be infected with the insect pest in question, they will be allowed to be returned to their consignors at their own expense, by their Natal agents, if desired, but the introduction, by rail, of any of the fruit quoted, is strictly forbidden, and any consignments thereof introduced in contravention of the above will be confiscated and destroyed.

Partners with Capital.

Since his appointment in London, Mr. Chiappini has had to deal with a number of applications forwarded through the office of the Superintendent of Agricultural Co-operation, asking for partners with capital willing to enter upon land settlement and farming in this Colony. In a recent communication he points out that he believes he can do a great deal through the Trades Commissioner's Office by introducing such openings to would-be settlers with capital in England if full particulars are forwarded to him by persons interested. It must, however, be understood that certain small expenses would be incurred in inserting advertisements in Estate and Farming Journals in England, and also in investigating the financial standing of applicants, and such charges must be guaranteed by those forwarding enquiries from this side. Anybody interested in securing partners with capital, or otherwise encouraging the development of farming should communicate with the Superintendent of Co-operation (Mr. P. J. Hannon).

The Tobacco Industry.

A full report on the recent experimental efforts at French Hoek in the cultivation of Turkish Tobacco is published in this issue. Dr. Nobbs, the Agricultural Assistant, there gives the fullest possible details of the whole process, which should be sufficiently clear to guide any further endeavours in that direction, and it is to be hoped that these efforts will be continued in order, if possible, to establish an industry which promises to prove profitable to the growers That there is another side of this question, however, is shown in the letter we publish from Mr. C. Voet. This gentleman lays his finger on an aspect of the recent experiments which calls for some consideration. That is the commercial side. The grower may argue that these niceties do not affect him very much. Here, he sees, is an article which can be produced, and for which he can obtain a very much higher return than he is offered for anything else of the kind. The fact that it is of even greater benefit to the manufacturer than to the grower does not concern him so long as he can secure such large returns. But should this industry assume anything like large proportions, this aspect of its economic side will have to be considered. The fact that the duty on this article is 3s. per lb., and that the highest price realised for the French Hoek product was 3s. 2d. per lb., while the average price works out at 1s. 5d. per lb. must cause the economists some doubts as to the attitude of the manufacturers. Another aspect which presents itself is this: Presuming the industry to prosper, the revenue must suffer by the amount now realised from this source. How is this to be made up? And again, will it pay, when the requirements of South Africa are filled, to attempt to compete in the world's markets? These are some of the weaknesses essential in a case founded upon what practically amounts to a protective duty. In the case in point, the removal of the duty would mean that the product was worthless—that is at the prices paid. Not that there is any likelihood of the duty being removed, or even modified; but these are questions which are bound to come up for consideration if anything like a large industry is to be developed.

Castor Oil as a Crop.

The particulars published in this issue showing the results of some experiments in the cultivation of the Castor Oil Bush, were originally the outcome of a suggestion that it should be possible to produce the oil here instead of importing, as there is already a fair demand, which may be expected to grow in the course of time. Many correspondents have raised the same question; but the results of these experiments should satisfac-

torily answer most of them. It is evident from this that no matter which way it is looked at this crop would never prove over remunerative by itself, but that does not preclude the possibility of making use of odd pieces of land for it upon which no other crops could not be satisfactorily raised. This aspect might be considered if the after question of manufacture were placed on a satisfactory basis. Perhaps some of the larger users of such oils might be able to offer some information on this side of the subject. One point which always has to be considered in such a subject as this is the conditions of those who produce the commercial article at present. It will generally be found that their circumstances are very different to ours. If we had a large supply of cheap labour such as they have in India or Egypt, many industries could be established which are at present impossible. But with our existing circumstances, and the great demand which exists here for foodstuffs and other more profitable crops, the establishment of such an industry as this does not seem to hold out any great promise of permanency. Still it is as well to have the information before us which is supplied in the report in question, because if it does nothing else it should serve to convince the more sanguine believers in the economic possibilities of such crops that they are not altogether reliable guides for the public to follow.

Sale of Cape Produce in London.

In view of the energetic arrangements that are being made in Great Britain for the disposal of Cape produce, it is considered necessary to provide as far as possible for the use of the Trades Commissioner, samples of articles which may be available for export, with particulars of the minimum quantities which may be relied upon in the event of satisfactory trade relations being established. The Superintendent of Co-operation will be obliged therefore if business firms, farmers and others will forward to his office, for transmission to London, samples of produce which they may be in a position to offer, with complete information of the quantities available, and the minimum price at which they would expect their goods to be sold in England. All samples will be forwarded to the Trades Commissioner, and will be kept for purposes of inspection in his office or distributed in such manner as may tend to the development of trade, but the prices quoted by possible exporters will not be used by the Trades Commissioner except for his own information. It is to be hoped that everyone interested in the organisation of industrial effort in the Colony will endeavour to comply with this suggestion, and enable the Government to assist in the extension of markets for Cape produce.

Cape Pineapples in London.

Mr. Chiappini, the Trades Commissioner in London, recently reported as under on the subject of Pineapples: "I enclose herewith a copy of a letter from Mr. B. Goldberg, with whom, you will remember, I arranged with regard to the selling of 1,000 cases of Pines per week for four weeks on trial, if they had been received from the growers. Mr. Goldberg has not only handled nearly all the consignments of Pines received from the Cape, but has also disposed of the majority of the shipments from Natal during the last two seasons. This letter speaks for itself, and I would suggest that it should be communicated to the growers and other interested."

Mr. Goldberg's letter reads: "As requested, I beg to report on the two last shipments of Pines *ex* 'Briton' and 'Saxon.' The appearance on

opening was generally excellent, and of better size and colour than formerly. A still deeper gold colour and absence of blotches would enhance the value of the fruit. This could be achieved by wrapping the whole of the fruit, including the crowns, in grease paper. The great point to observe is to *cut* the Pines with at least 1½ inches of stalk, and not to pull or twist the fruits off the plants. Although the fruit by the 'Saxon' had a very good appearance, when cut they were most unsatisfactory—being black right through. I noticed this mostly in those which had *not* been wrapped in paper, and had no stalks left on the fruits, the expense of which I had to make good to the buyers. I have also to comment on the grading. In a case of two dozen, I found half of the Pines barely a pound in weight. These are of no use whatsoever for this market. With regard to the eight large size Smooth Leaf Cayenne Pines, I should like to have a small consignment of these, packed and cut as mentioned above, which I think, if they arrived in good condition, would find a ready sale, and a good market."

Mr. Chiappini adds the following comments: "You will notice in the report given by Mr. Goldberg, he mentions a defect which has not occurred before, that the pines have turned brown inside. This is probably due to the warm weather at this time of the year. I think this can be overcome by packing the fruits in a greener state. This recommendation, therefore, only applies to fruit arriving during the English summer months, as they will ripen in the warm weather here, but in the winter months they will not ripen well after arrival."

Awards to Cape Exhibits.

The Trades Commissioner writes: "I have pleasure in stating that at the great Annual Horticultural Exhibition of the Royal Botanical Society held this week in Regent's Park, Messrs. Robert Jackson and Co. obtained a silver medal for a very fine display of Cape preserves, and Messrs. J. Sedgwick and Co., who were represented by their agents, Messrs. Jeremiah Lyon and Co, also obtained a similar award." Mr. Chiappini states he will be glad to receive communications on any subject connected with South African trade which may be of either general interest to the British public or of special interest to some interested trade or trades, and if these were sent to him he would see that copies were made and sent round to the most suitable papers. One of the subjects which the Trades Commissioner wishes to work up by these means is quinces, and a description of the fruit will have to be sent to the papers, together with a few particulars of its cultivation and methods of preparing it for the table, and when the public read of its excellent flavour, etc., enquiry will be created for it. The same remarks apply to such things as mebos, bush tea, small sultanas, etc.

Exhibitions in London.

Arrangements were made by the Right Honourable the Prime Minister and the Honourable the Commissioner before leaving London, with the Trades Commissioner, to take the most central space in the Royal Agricultural Hall, Islington, at both the Confectioners, Bakers, and Allied Traders' Annual International Exhibition which will open on the 7th September and close on the 14th idem, and at the Grocery, Provision, and Allied Traders' Exhibition from the 21st to the 28th September inclusive. The Government has made a grant of £50 towards the necessary expenses of furnishing the tabling and attendance, and it is notified to the various manufacturers and exporters of jams, komfyts, and preserves, of hotchpotch, blatchang, chutney and other sauces, of wines, brandies and

liqueurs, of berry wax, biscuits, currants and sultanas, mebos and other dried fruits, and other such products as come within the sphere of confectioners, bakers, grocery and provision merchants, that the space is at their disposal free of charge, and if they wish to be represented they should be sure to send over a special selection of cases, c/o Messrs. Robert Jackson and Co., 172, Piccadily, who have kindly undertaken to provide the men to dress the stall and afterwards assist in the exhibition.

There will also be an exhibition of Colonial grown fruit, both fresh and preserved (in syrup or dried) in the Royal Horticultural Hall, on November 28th and 29th next. The Trades Commissioner recommends all manufacturers of preserves and dried fruits to authorise him to see that they are represented individually at this Exhibition.

Medals will be awarded by the Council of the Royal Horticultural Society, after consultation with their judges, to exhibitors on their merit. Thus it is possible that more than one firm may get a gold medal, or if the exhibits do not warrant a very high award, possibly only silver medals will be given. The advertisement to be derived from these exhibitions among interested parties, visitors, and newspapers is very great. As the space at the various shows this year is being given free, and at the Royal Horticultural Show the tabling is being provided gratis, and the Government are giving the fittings at the Royal Agricultural Hall, it is hoped that growers will cordially second these efforts on their behalf by each sending a few cases of their best for sale or sample distribution as may be found best for their benefit. They will not be put to any further expense beyond the freight charges. Mr. Chiappini considers these special exhibitions are of the greatest possible service to the Colony as they bring the products before both the wholesale and retail consumers, not only at the exhibitions themselves, but also through the medium of newspaper reports

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Wallace's "Farm Live Stock of Great Britain."

We have received from Mr. T. Maskew Miller, of Adderley Street, Cape Town, a copy of the latest work by Professor Wallace, the well-known writer on agricultural subjects. This is the fourth edition of "Farm Live Stock of Great Britain," which now appears as a much more bulky volume than the previous editions. It has been practically rewritten, and increased by about fifty per cent of additional subject matter with a comprehensive set of new plates, numbering more than double those in the third edition. The histories of the numerous and distinct breeds of British farm animals have been very carefully and fully extended from the recognised standard authorities (mostly Youatt and Low) and the writers of the different county histories, and from the prefatory statements contained in the numerous herd, stud and flock books issued by the various breed societies. This book is intended to be a guide to breeders of all classes of stock, and a text-book for students of agriculture, and as such its contents should appeal to all interested in these subjects. Professor Wallace wields a facile and interesting pen, and holds the secret of making an otherwise dry subject sufficiently alive to attract and hold the attention of his readers. In this book he has succeeded in gathering together most of the leading facts connected with the wide range of subjects covered, and he presents them in such a form that very few could turn away without finding something of more than usual interest. He has taken thirty lengthy chapters and an appendix to complete his work,

and it has to be admitted that it is well done. Starting with the principles of breeding, which he presents exhaustively in the light of the most recent authorities on that subject, he proceeds to deal in detail with the various breeds of British cattle down to the most modern developments. A chapter is devoted entirely to the Breeding and Management of Calves; another to the Grazing of Cattle, their Diseases and Poisons; then follow chapters devoted to House-feeding and Selling Cattle by Live Weight, Dairying in all its aspects, from Pasture and Food to Cow Milking Machines, and the very latest developments in Dairy Machinery and Dairy Methods. Pigs occupy a goodly space, which is followed by no less than five lengthy chapters on Horses, which not only give the particulars and histories of the various breeds, but contain some valuable information on Breeding, Breaking and Management. The Sheep section, though very exhaustive, and of deep interest to every sheep man wherever he may be, will not, perhaps at first, appeal to the average sheep farmer in South Africa, because it deals mainly with the British breeds. But as there are two chapters entirely devoted to sheep management, feeding, and breeding, there can be little doubt as to their value even in this country if studied with care, and the information there given properly applied, with full allowance for local conditions and practices. The last chapter is devoted to sheep dogs, the rough and smooth collie, etc., a subject not yet sufficiently appreciated here. Probably after reading this portion of the book, some of our farmers may be tempted to take more interest in that subject. The appendices include Farm Stocking Calculations; Lists of Herd, Stud and Flock Book and Breed Societies; Progressive Movements of the Horse after Mybridge; List of Champion Cattle at Smithfield, etc. When we add that the book is beautifully illustrated from cover to cover, and is got up in excellent style, with good type and well printed on good paper, it will be acknowledged that it is well worth the price asked, viz., 20s., or 22s. post free. Mr. Maskew Miller will be pleased to forward to anyone on application a very handsome prospectus of the book showing the illustrations and style in which it is got up. It is a work that should be in the hands of all progressive breeders, for it contains in a condensed form all that is of real importance on the subject of breeding, and as such should prove of great value.

FARM AND VELD.

Reaping Attachments on Mowers—Karoo Bush Seeds.

"Jay" writes: "Can any reader tell me if the reaping attachments to ordinary mowing machines work satisfactorily; also where I could obtain a few seeds of the best Karoo and stock bushes?"

The reaping attachment to an ordinary mowing machine enables the farmer to use the implement not only for lucerne or hay but for wheat or oat crops, which in cutting have to be gathered into sheaves. The device is simple and in every way satisfactory, materially increasing the scope of the mower. It entails the use of an additional man seated on the reaper to lay up the sheaves as the machine progresses. It is impossible to direct a correspondent to any address where seed of Karoo Bush may be purchased, Karoo farmers as a rule not paying much attention to these matters. Any farmer who has collected such seed will oblige by communicating with the Department.—E.A.N.

Burr Clover—("Medicago Maculata").

A correspondent writes: "Can you or any readers of the *Agricultural Journal* give me any information about a plant called Burr Clover, grown in Australia."

Burr Clover (*Medicago maculata, M. denticulata*), is an annual that was introduced into America and other countries from the regions round the Mediterranean. It is not a true clover, but is closely related to lucerne, to which it is, however, much inferior in feeding values.

In the United States it is considered of value as a winter grazing crop, and is mostly used for sheep and cattle. Horses and mules do not graze it readily. If this clover is used as a sheep pasture it must be kept closely grazed, as wherever the burrs are allowed to form they become entangled in the wool, and the value of the fleece is greatly diminished, as has been experienced by the farmers in other countries, and also at the Cape, where the Burr Clover (*Trifolium Burchelli*) grows wild, seeding itself every year, and so making a practically permanent winter crop. As a rule Burr Clover does not grow tall enough for hay making, and the hay is not relished by stock.

The Aloe ("Agave Americana").

The following notes by Dr. E. A. Nobbs, Agricultural Assistant, on the Aloe (*Agave Americana*) will be of interest to many of our readers:—The Aloe (*Agave Americana*) is a native of Mexico, and is as a rule not grown for its fibre, but for the making of the drink, pulque, as a

hedge plant, and in this country for feeding to cattle, sheep and ostriches. In several of the Indian States, however, a considerable amount of fibre is taken from the Aloe, of which there are two varieties grown, *Agave Vinipora* and *Agave Americana*, the latter giving the longest fibres. The extraction of the fibre is done chiefly by hand. Two methods are employed: (*a*) Scraping. (*b*) Maceration. (*c*) By mechanical means.

(*a*) *Scraping.*—The leaves are cut and the sharp spines and tops removed with a knife. They are then split longitudinally into four or five pieces, which are beaten with a wooden mallet, and then placed on a board 4 ft. by 4 in. by 3 in., and the pulp removed by means of a bamboo scraper, after which the fibre is dried in the sun, and is fit for export.

(*b*) *Maceration.*—The leaves are cut and the spines removed as above described. The whole leaves are then thoroughly beaten with a wooden mallet and thrown into tanks or wells, where they are left for 14 to 20 days, or until the pulp has quite decomposed. The fibre is then taken out, dried and bleached in the sun.

(*c*) *Mechanical Means.*—Under favourable circumstances the plants yield leaves fit for fibre production when three years old. In this country probably a longer period will be necessary. Plants from six to eight years give an average yield of 15 leaves per annum.

According to the *Indian Agricultural Ledger* No. 18 of 1894, fibre produced by passing the leaves through the Death Machine and submitted to the authorities of the Royal Gardens, Kew, as well as Messrs. Ide and Christie, Fibre Experts, for valuation, in comparison with the hand-cleaned fibre, was considered to be twice the value of the samples prepared by scraping and maceration. In the Colony up to the present time, no attempt has apparently been made to extract fibre from this plant, though the feasibility of aloes as a fibre crop was suggested by Mr. Rubidge, of the Graaff-Reinet district, who has his farm camped and cross-camped with aloes, in 1893. He proposed that the fibre should be extracted and the pulp fed to stock. The aloe grows fairly luxuriantly throughout the Colony, but especially well in the warmer parts of the Karoo, in some districts of which it is extensively cultivated for feeding to stock.

Potatoes and Fertilisers—Broadcast v. Drill.

Mr. Peter Leach, of Newmarket, East Griqualand, writes under date July 16:—"I have been growing potatoes in this district for the past three seasons, and intend doing so on a larger scale in the near future. I would like you, therefore, to give me some advice as to the application of artificial fertilizers. Hitherto I have been using a fertilizer manufactured by the South African Fertilizers Co., Durban, Natal, called "Potato Fertilizer." Now the help I require from you is, as to whether fertilizers of this sort will have the same beneficial effect upon the crop if broadcasted on the land and then ploughed in with the planting of the crop. I have so far always had it strewn in the drills, and the planting to follow immediately after. This process, however, is a back-breaking business, and to say the least of it, when performed by the native labourer such as we

have in these parts, a very uncertain operation, so far as irregularity is concerned. Some parts get too much and another not enough or none at all. I was told the other day that broadcasting is far more simple and is every bit as efficacious. It occurs to me, therefore, if this is right, that after the broadcasting, a harrowing and cross-harrowing, thus thoroughly mixing the surface soil with the fertilizer, would be an improvement. Can you advise this method?

"My ground for the coming season's crop has already had two ploughings within the past two months, the last turnover being a foot deep. The field is a 25 acre lot, which had carried a crop of Cocksfoot grass for the past 16 years, and has not been ploughed since the grass was planted. Native grasses in the meantime, or for the last few seasons, have supplanted the Cocksfoot. This soil will grow a good crop of mealies without the help of fertilizers, but I feel such would not produce a decent crop of potatoes without it. Could you advise the use of guano, such as I understand your Department supplies. Would this not be cheaper and as good as that I have been using, which is sold at £7 15s per ton of 2,000 lbs. in Durban?"

The relative merits of applying artificial manures broadcast or in drills is a matter of a somewhat theoretical or academic character. Each method has its supporters, who refer to experience each way for confirmation of their views. Sowing in drills is perhaps to be preferred, provided each set is not dosed with a handful of manure so close as to liven it up, as sometimes happens. The correspondent does not state whether he plants on the flat or in drills. If the former process is adopted, the fertilizer may be sown in the drills without the breaking of backs referred to if the sower walks quite erect along the furrow immediately before planting or after planting, and before burying the sets, and throws the fertilizer forward with the right hand, knuckles to the rear fingers nearly straight and pointing downwards. There should then be no difficulty. If the potatoes are planted in drills, and a proper ridging (double-mouldboard) plough used, then when the first series of ridges are made, and the sets are being placed in the furrows, fertilizers may be sown broadcast over the surface, for in splitting the ridges and burying the sets the manure is thrown together into the ridge covering the sets In any event, there is little to choose between broadcast and sowing in drills. Any of the potato mixtures in the market are fairly well adapted for potato growing. Guano is scarcely sufficiently well balanced to be used instead of these preparations, but might with advantage be applied in addition, relatively smaller quantities of each being used. Guano is not generally indicated as requisite on land which has not been cultivated for years as in this instance, though it is impossible to dogmatise on such matters without personal knowledge of local conditions.—E A.N.

Why a Mycologist is Needed.

In my last report (writes the late Director of Agriculture in his Annual Report for 1906) I indicated the necessity for appointing a Mycologist. The engagement of such an officer is still being urged on the Government by the Western Province Horticultural Board and the Vine and Fruitgrowers' Congress, and I hope it will be possible to provide the funds for this purpose in the next Session of Parliament Hitherto the Transvaal Government has generously come to our assistance in determining and advising upon fungoid diseases, but the calls from this Depart-

ment upon the plant pathologist attached to that Government are increasing so rapidly that the appointment of such an officer for this Colony has become imperative. In the belief that a list of the questions which the Transvaal plant pathologist has under investigation for this Government will carry conviction better than a general statement, I append it: Bitter-pit in Apples; *Fusicladium dendriticum* affecting Apples; *Fusicladium pirinum* affecting Pears; Poplar Fungus; Tomato Rot; Eucalypt disease; Grape vine disease, Oidium; Bean rust; Fungus on *Phœnix canariensis*; Root rot of Poplars; Onion disease; Naartje fruit spot; Kei-apple disease; Potato disease, *Macrosporium solani*; *Fusarium limonis* affecting Citrus trees; Barley fungus, *Helminthosporium teres*; Rye rust; Barley smut; Wheat disease, "Black stem rust"; Red scale fungus; Variegated Apple leaves; *Glocosporium ampelophagum*; Apple-split fungus; Water core in apples; Pelargonium rust; Mulberry disease; *Leptothryium pomi* affecting apples; Oleander disease; Peach freckle; Disease in *Pinus pinea*; Disease in *Pinus insignis*; Galls on *Acacia horrida*; Disease in *Pinus taeda*; Maize rust; Cape Gooseberry disease; Prune disease; Plum disease; Podocarpus disease; Fig disease.

With regard to some of these, Mr. Pole Evans, the Transvaal officer referred to, writes:—"'Bitter Pit' in Apples, as you are aware, has been investigated in great detail. It has hitherto completely baffled plant pathologists all the world over wherever the disease is found. I have obtained certain facts of some significance, the following up of which I feel confident will eventually solve the mystery. But there are a number of other diseases which I have felt it my duty to the country as a whole to expend no little time and labour over. The obscure Pine disease is one of vital importance to Cape Colony, and should be investigated without delay. The Cape Gooseberry disease, which I found was due to the fungus Entyloma, has caused growers in that Colony no end of trouble, and is likely to cause them even more, for I have found experimentally that one of our most common South African weeds (*Physalis minima*) carries the same fungus An obscure Prune disease is another trouble which must be investigated on proper lines before they can hope to remedy it. All these pests should be tackled one by one. To be worked out properly any one of them may require one man's sole attention for three or four years, or even more These are only some of the more pressing problems."

The Castration of Ostriches.

Mr. J. M. Louw, of Oorlogs Kloof, Nieuwhoudville, writes:—In your issue for June, I notice an article on the castration of ostriches. Could not some one of your esteemed readers or Veterinary Surgeon Elley give me some information on the following point in connection with this operation, viz.: Is castration of ostriches on a large scale to be recommended for ostrich farmers? Has the operation a calming effect on the male bird, and does it in consequence improve its general condition and feathers? Can the operation be performed without any great risk to the bird?

Mr. S. Elley has published one report in the *Agricultural Journal*, and is now, we understand, preparing another which will be published so soon as received. But the following extract from the *Oudtshoorn Courant* may be of value to our correspondent. That paper, (dated June 27) said: It is just about a year ago that Mr. S. Elley, the resident Government Veterinary Surgeon, began demonstrating and experimenting with his theory of the castration of ostriches in this district. It is time, therefore,

that we looked for some results, and what do we find? At the outset of Mr. Elley's experiments, before he came to this district, he operated upon half a dozen cock birds belonging to Mr. Probart, of Glen Harry, in the Graaff-Reinet district, the owner at the time telling the operator that he did not consider the birds worth a pound apiece. Now he tells Mr. Elley that he has had heavy and very much improved pluckings from these birds, and that their value has increased a thousand per cent. Mr. Walter Rubidge, M.L.A., of Graaff-Reinet, has had 250 cocks operated upon, besides having a number of hens speyed, and he is little short of enthusiastic over the results, saying that the system will cause a small revolution where ostrich farming is carried on in big veld camps, as there will be no more unmanageable birds to deal with, and broken and spoiled feathers will be reduced to a minimum. Mr. C. G. Lee, of Klipplaat, is also a complete convert to the system, and Mr. Elley is going to operate upon a large number of birds for him. The names we have mentioned are a sufficient guarantee that ostrich farmers of the highest standing in the Midland districts are pinning their faith to a new article of creed, and that our Veterinary Surgeon has really "struck oil," as the Americans would say. In this district the system has not yet "caught on," which may be accounted for by the fact that most of the experiments have been conducted with birds belonging to owners of quiet camp-bred stock, and that the real value of Mr. Elley's new departure has not yet been sufficiently demonstrated in regard to birds running half wild in big veld camps.

Prickly Pear and Jointed Cactus.

Last Session (writes the late Director of Agriculture in his Annual Report for 1906) a Select Committee was appointed by the House of Assembly to consider the best means of preventing the spread and securing the destruction of Prickly Pear and Jointed Cactus, and of assisting farmers and others in this object. The Committee brought up a report recommending compulsory extirpation, with State aid according to a graduated scale, by which the Government should contribute one-eighth of the cost if under £100, one-fourth if £100 or under £500, one-third if £500 or under £1,000, and one-half if £1,000 or upwards. Once an area was clean it would be obligatory on the owner to keep it so. The Government and public bodies were to have similar duties imposed on them in respect of Crown or public lands. The Committee recommended immediate legislation, but at the same time urged on the Government "the desirability of carrying out experiments with all such preparations and processes as may appear feasible, with a view to ascertaining and demonstrating the most effectual and economical means of dealing with both species of Opuntia." About 15 years ago experiments were conducted departmentally, and, as a result, a pamphlet was issued recommending farmers to uproot the plant and stack it, pricking each layer successively and spraying it with Arsenite of Soda. This method was from time to time favourably reported on by farmers, and a great deal of useful work was accomplished in this way. Many farmers, however, have taken no steps to get rid of the pest, and while this attitude continues farms which are not cleared will always remain a source of danger to other properties in the neighbourhood, considering that any portion of a plant will strike root where it may be dropped. Mr. P. J. Pienaar recently patented a preparation for destroying Prickly Pear. This has been reported to give satisfactory results, destruction being effected by means of injections of the chemical into sections of the growing plant. While Mr. Pienaar's preparation is sold at about double the price of Arsenite of Soda, the cost of uprooting and stacking, speaking generally, is saved to the farmer. Other preparations have also lately come into the market.

Legislation on the lines recommended by the Select Committee would involve large expenditure. It has been roughly estimated that the infested area is about 500,000 morgen. I am inclined to think it is a great deal more. Some farmers reckon that the average cost of clearing ground of Prickly Pear under the method recommended in the Departmental pamphlet is about 5s. per morgen. If this may be taken as a guide, the cost of clearing 500,000 morgen would be £125,000, and the expense to the Government under the Select Committee's scheme would in that case probably be about £50,000. But it would be a hardship to farmers to compel them to destroy Prickly Pear and Prickly Cactus under the present methods if the cost could be lessened, and unfair to the general taxpayer. The suggestion of the Committee that further experiments be carried out is, therefore, being acted upon. [Since the above was written these experiments have been completed, and a full report may be expected shortly. —Ed. *A.J.*]

Gardening Notes.

August.—After the middle of the month potatoes of the earlier sorts may be put into high and dry situations; the Early Rose usually gives the best results at this season's planting. Vegetable marrow, cucumber, French beans and mealies for a main crop can now be sown. Root crops, viz., turnips (six weeks), carrots, beetroot and parsnips, should still be sown for consecutive cropping, especially on such lands which were earlier neglected owing to their wet condition Peas can be sown in suitable sites for later cropping. Cabbage may again be sown and young plants transplanted. Egg plants should be set out from the seed beds during the latter part of the month. All standing crops should now be given thorough cultivation to loosen and aerate the soil after the hardening down by the winter rains. It will pay most growers to plant their vegetables sufficiently far apart to allow of this work being done by the small disc cultivator, instead of the more costly handwork of the spade or hand hoe. Onion plants should be planted out on prepared lands for a main crop, and the ordinary spinach sown.

September.—In the Western sections this is the busiest planting time for the market gardener, and though no man in the country can plant by the calendar, one may usually lay down the rule that almost all sorts of vegetables may be put out this month, in suitable localities. The main potato crop, excepting that grown in vley lands, should be set now. Selecting the best tubers for seed is always advisable. Onions may be yet planted out when the land is ready to receive the transplants. Cabbage, tomatoes, beans, mealies and root crops of all kinds, and gourds, including cucumbers, melons, watermelons and pumpkins, should be put in. Successive crops of lettuce may be pricked out and spinach sown in well-manured beds, and rhubarb seed in well-prepared land. Tubers of the Jerusalem artichoke can be put down and mangolds set out for stock-feeding purposes later on. Here it may be mentioned that the Yellow Globe mangold is every way superior, both for keeping and stock-feeding purposes, than the long red usually grown. This month kitchen herbs of all kinds may be sown in beds, and the weakest plants thinned out later on. Tubers of the Jerusalem artichoke should be planted in much the same way as potatoes, only the rows should not be less than three feet apart, and the distance between each tuber at least twelve inches. This is recommended in order to obtain crops of first-class artichokes instead of the puny tubers one so often sees in the local markets.

Melons and watermelons are included here under the heading "vegetable"; from the manner in which they are eaten they are classed as fruits, but from their botanical classification and manner in which they are grown they may certainly be called "vegetables." Watermelons thrive best when planted upon newly broken lands of a sandy nature. It will scarcely pay anyone to grow a crop upon any but subsoiled or trenched ground. The varieties found best adapted to local conditions are Ironclad, of dark and light striped colour, large and uniform in size, very red and compact flesh, rind tough, a good keeper and shipper. Cuban Queen, striped with light and dark green streaks, of large size, strong grower, very productive, fairly and generally uniform in size, flesh red and solid, and a good shipper and keeper. Ice Cream, one of the best eating varieties, medium in size, light red flesh with red seeds, blotched and streaked with light and medium dark green, more delicate in growth and habit than the above-named two, thin rind, a most brittle fruit, a poor keeper, and not recommended for any but the local market, where it is largely sought after, and is a great favourite owing to its delicious flavour. Mountain Sweet, most like Cuban Queen, but sweeter in taste and much longer shaped melon.

Egg plants should also be planted out in situations where heat and moisture will favour it later on. It will grow on any good garden soil, but not thrive equally well as on those which have an abundance of moisture during the hot weather.

A RECENTLY INTRODUCED BORER-BEETLE.

(PHORACANTHA RECURVA, NEWM.)

As a borer beetle (one of the Phoracanthids), indigenous to Western Australia, has attacked certain Eucalypts, especially *Eucalyptus viminalis*, in the Government Plantation at Ceres Road, farmers and others are requested to notify, to the local Forest Officer, the presence of this pest if discovered on their trees, together with any particulars they may be able to afford relative to its injurious effect. A description of the larvae and beetle, with explanatory plates, together with a few remarks by Mr. T. F. Dreyer, B.A., Assistant Government Entomologist, are hereto appended for general information.—J. STORR LISTER, Chief Conservator of Forests.

LIFE HISTORY.

The life history of the *Phoracantha recurva*, Newm., is quite unknown in this country. In Western Australia, where the insect is indigenous, it is only reported to attack dead wood, but in the case of Kluitjes Kraal at least, perfectly healthy trees have been and are being attacked; this new habit may, however, be due to unnatural multiplication of the insects.

It is possible, however, that this habit of attacking living trees will become confirmed and the seriousness of the pest greatly increased, consequently every effort should be made to eradicate it.

The following is an extract from a letter from W. W. Froggatt, Government Entomologist, Sydney.—"Yes, these are *Phoracantha recurva*, a common longicorn beetle in Australia. The beetle lays her eggs on the bark of the different species of Eucalypts, the resultant larvae feed for some time under the bark, which is thick, and after remaining some time between it and the sapwood they bore into the trunk and pupate several inches down. They seldom attack living trees, but dying or dead trees are often riddled with them. We often cut them out when splitting up blocks of firewood, and you have probably introduced them into the Cape with timber. I think any tree that is infested with them is sick, no healthy tree would be injured."

E. P. Stebbing, Forest Zoologist to the Government of India, in a report on a related insect (*Hoplocerambyx spinicornis*, boring in the Singhbhum Sal.), says:—"I agree that dying (not dead) standing trees are more liable to attack than healthy ones, but in the case of severe infestations of the pest in a block of Forest the beetles will attack healthy trees when either the stock of dying trees is giving out, or they have themselves increased in such numbers that the supply of the material they prefer is running short."

In the Eastern Province two very similar beetles have been introduced in Turpentine (*Syncarpia laurifolia*) piles. Their markings are very like those of the *Phoracantha recurva*, but they are of a lighter colour, and they are also more slender; reference to Figure III. will enable anyone to distinguish between these quite easily. The beetles from the Turpentine piles have been determind by the Government Entomologist, Sydney (W. W. Froggatt), as *Coptocercus rubripes*, *Boisd.*, and *Coptocercus biguttatus*, *Donov.*

Fig 1

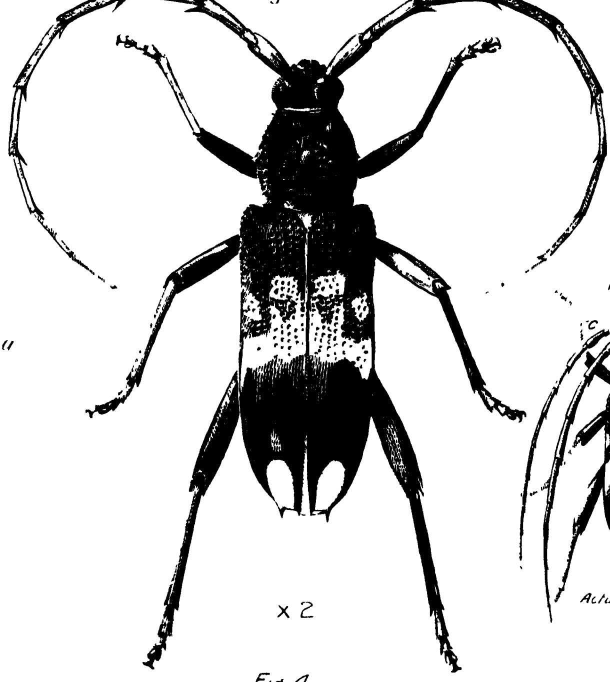


Fig 3

Fig 2

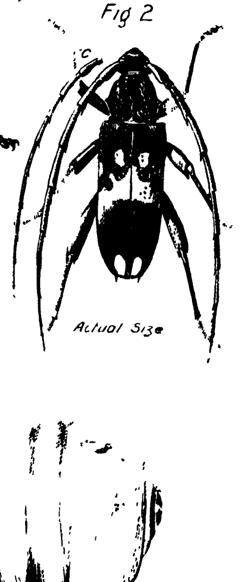


Fig 4

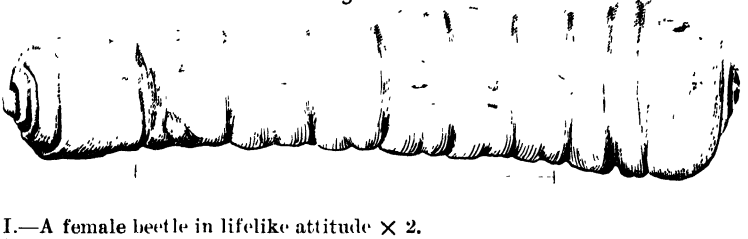


Fig. I.—A female beetle in lifelike attitude × 2.
Fig. II.—Male beetle (life size), with a comparative female antennae.
Fig. III.—(*a*) Leg of *Phoracantha recurva*.
(*b*) Leg of *Coptocercus biguttatus*.
Fig IV. Larva (× 2) form *Eucalyptus viminalis* at Tulbagh. Much larger than larvae from Ceres Road, but of about the same shape.

SECTION OF EUCALYPTUS VIMINALIS FROM KLUITJES KRAAL PLANTATION, SHOWING THE RAVAGES OF THE BORER.

DESCRIPTION OF LARVAE AND BEETLE.

Larva: Stout, tapering towards the hinder extremities, with squarish section, consisting of 14 segments.

Head: Black in front, brownish yellow, further back the 2nd segment (the prothorax) is much enlarged, and has a squarish dorsal plate, harder than the rest of the body. The 3rd and 4th segments are very narrow, while the 5th is a little broader, and the succeeding ones continue to become broader till the 11th. The 12th, 13th, and 14th segments are telescoped in the preserved specimens. On each of the three segments following the head (the thoracic segments) there is a pair of exceedingly minute feet, while on each of the following segments there is a pair of lateral, ventral, raised patches covered with very small spines.

Pupa: Not seen yet.

Adult Beetle: A stout, yet graceful beetle of a very dark brown colour and white markings, as in the drawing. They vary very greatly in size, the difference probably depending on the quantity and quality of food obtainable.

Head: Prominent and much sloped forwards; mandibles stout. Antennae rather light brown, and more so towards the extremities. Relative lengths of antennae of male and female shown by Fig. 4.

Thorax: Strongly ridged, as in Fig 1.

The ♀ (female) differs from the ♂ (male) in having the antennae much shorter, but otherwise they resemble each other.

MILK RECORD.

ELSENBURG COLLEGE HERD.

Subjoined is the Milk Record to July 31st :—

Breed and Cow.	Days in Milk.	Total lbs. given.	Daily Average. lbs.
FRIESLANDS.			
Cleopatra	282	8070·	28·6
Romula	170	5496·	32·3
Victoria	159	4345·	27·3
Violet	42	1444·	34·3
JERSEYS.			
Gladys	55	1963·	35·6
Gertie	45	1570·	34·8
AYRSHIRES.			
Cherry	101	2389·5	23·6
Queen Dot	50	1616·	32·3
SHORTHORN.			
Maggie	311	6101·5	19·6
CROSSES.			
*Bessie	266	7822·	29·4
Disa	119	2736·5	22·9

*Dried off on the 23rd having been 266 days in milk and given 4,692 bottles.

[Thus there were 10 cows in milk for the month and one for 23 days. They gave 854 gallons of milk or just on 15 bottles per day; the average number of days in milk being 145 or almost 5 months.

THE CULTURE AND CURING OF TURKISH TOBACCO IN CAPE COLONY.

REPORT ON THE FRENCH HOEK EXPERIMENTS.

By Eric A. Nobbs, Ph.D, B.Sc, Agricultural Assistant.

In July of last year it was brought to the notice of the Agricultural Department that there had been grown for two or three years previously, in the vicinity of French Hoek, a small quantity of Turkish tobacco having all the properties of that much sought for article The great possibilities opened up by this fact being apparent, arrangements were made for a comprehensive trial on a scale which, while strictly experimental, would yet suffice to determine whether Turkish tobacco might or might not be grown on a commercial scale.

The cultural operations and curing process are alike altogether different to those of ordinary tobacco, and it was necessary first to obtain a knowledge of these methods, and then to see whether they were feasible for us to adopt in this Colony.

Arrangements for experiments to be tried were made on nine farms, each farmer supplying the necessary land, labour and manure, while the Department provided seed, skilled instruction and supervision Turkish tobacco was also grown at the Government Experiment Stations and at Elsenburg. On these nine farms situated in French Hoek and Drakenstein, about seven and a half acres of land were devoted to the crop, and about 120,000 plants grown.

The returns are much below what they would have been had the seed been earlier sown, and two seasonable crops instead of one late one secured, and higher prices would have been secured had the niceties of the business been better apprehended by the growers Knowledge of these matters will take some time to be acquired, and besides inexperience this year the experiments were at a disadvantage in being sown late and planted on land not duly prepared for the purpose in a remarkably dry season, yet one with the full quota of potato moth and surface caterpillar, and later on mildew. An exceptionally heavy fruit crop also took away much of the attention otherwise available for tobacco

The soil was, generally speaking, poor, sandy ground, originally vlei or sour veld, in some cases new land, but as a rule long cultivated for potatoes, onions and the like. The ground is not naturally fertile, and requires liberal manuring for all crops. Differences occurred, as will be seen in the accompanying notes. There is a large area of ground of the same character in the Colony, especially amongst our mountain valleys of the west, south-west and south coast, while it seems reasonable to anticipate that richer land will also prove not inappropriate.

It seems generally correct to say that soil on slopes and closer to the mountains has done better than in the open level country. In Turkey this tobacco is grown in the mountains on poor and stoney soil. Dampness is

probably necessary in some measure, but the best tobacco was grown absolutely without irrigation, and the plants seemed to withstand drought and withstand winds better even than did mealies growing close by. This was repeatedly observed.

The following notes furnish details of the farms in question:—

1. *Mr. J. J. le Roux, la Province.*—Half an acre of long cultivated sandy land, adjacent to vegetable gardens, received 8 tons of stable manure. The land was ploughed deep but only once, and the tobacco planted 3 feet by 9 inches.

2. *Mr. A. C. Siebritz, Dassenberg.*—Over half an acre of new land of a clayish nature was given 15 tons of stable manure and ploughed once over, the plants being put out at 2 feet by 9 inches.

3. *Mr. E. G. Haumann, Keurvlei.*—About two-thirds of an acre of vlei ground, sandy, but proved well suited for the purpose, was given 6 tons of sheep manure, and the tobacco planted out 2 feet by 9 inches.

4. *Mr. J. G. Kriel, la Dauphine.*—About three-quarters of an acre of deep, sandy land, trenched 18 inches deep and treated with 6 tons stable manure Again the tobacco was planted 2 feet by 9 inches.

5. *Mr. A P. Roux, la Champagne.*—2 acres, one acre of black vlei ground long under cultivation, and one acre of brown loam on a steep slope planted with fruit trees. Three truck-loads of stable manure were applied, and the tobacco planted out 2 feet by 9 inches. This soil was one of the very best for the object in view.

6. *Mr. J. S. Hugo, Roberts' Valley.*—1½ acres of a good vlei land, partly garden and partly grain land, received 10 tons of kraal manure. The soil of this farm proved to be better adapted for Turkish tobacco than most of the others. Again the planting distance was 2 feet by 9 inches.

7. *The Honourable C. W. H. Kohler, M.L.C., Riverside.*—Nearly one acre, partly a heavy clay on the level ground, and part light sandy soil on a slope. Each portion received one truck of stable manure, and the planting distance tried in this case was 3 feet by 12 inches. These soils were shown to be well adapted for the tobacco.

8. *Messrs. H. E. V. Pickstone and Brother, Delta, Groot Drakenstein.*—A small patch of sandy loam, in good order and condition, was planted out 3 feet by 12 inches. This was also one of the more favourable soils.

9. *Mr. A. J. le Roux, Scherpenheuvel.*—1¼ acres of sour veld on a moderate slope newly broken up, much exposed to wind and sun, yet proved one of the best soils in the series. Twelve tons of kraal manure were applied, and the tobacco planted 18 inches by 9 inches.

The details given below are not merely a statement of what was done, but include recommendations for future guidance, based on the experience gained in these trials.

Preparation of the Land.

Owing to the fact that the matter was not taking up till July, the preparation of the soil could not be undertaken in the best possible way, and as a rule only one deep ploughing was given. Thorough and careful preliminary tillage is necessary; three or four ploughings are recommended and practised in Turkey, and the soil must be brought into a fine tilth and deeply stirred. New braaked land, re-ploughed in April and May, should serve the purpose.

Manuring of Land.

In Turkey, stable, sheep and goat manure are all used, the two latter being preferred; no artificial fertilisers are used. The manure applied must depend very much upon the soil and its condition; on new land

twelve tons (24,000 lbs.) per acre of sheep or goat manure may be recommended, but much less on old lands long under cultivation and well treated in the past. The manure is applied broadcast, and as long before planting time as possible.

Seasons.

Seed may be sown from the end of May till the first week in August, and the proper time will depend upon the early or late character of the locality, and must vary in different parts of the country. It is the same as the seasons for ordinary varieties of tobacco. For French Hoek the best time for sowing is between the middle of June to the middle of July; the tobacco can then be planted out in the beginning of September, but this operation may be continued up till the end of October The approximate intervals are from sowing to planting out two months, then again two months till the first crop is ready for plucking, a couple of weeks for that process, then five weeks for the second crop to mature

The Seed-beds

The following has been found to be the best way of making the seed-bed :—

Select a warm, sheltered spot, not liable to dry out, and preferably with a northerly or eastern aspect, and trench it over, unless it already happens to be a piece of well-worked garden soil. Mark out beds 3 to 4 feet wide and any length, separated by paths a foot wide. Remove the soil to a depth of 10 inches, and lay at the bottom 4 inches of pure hot manure, then return the soil which has been dug out, but well mixed with old rotted manure, one-third of the former to two-thirds of the latter. A very fine seed-bed is then prepared with the rake After the seed-bed has been prepared it must be thoroughly wetted and the seed sown on the wet ground. On this bed the seed is sown thinly, using about one ounce to sixty square yards of seed-bed. To do this the seed is well mixed with sand or ashes, and sown half in one direction and half in another, to secure uniform distribution. The seed is covered by riddling over it a quarter of an inch or less of sand.

Should there be much danger from insect pests, fungus attacks or from weeds, the seed-beds should be burnt by making a fire of branches or rubbish on top of them till the soil is scorched to a depth of 3 inches and mixing the resulting ashes with the soil previous to sowing the seed. The sprouting plants must be protected from frost and wind. This is best done by surrounding the beds with planks and covering them with muslin or light canvas sheets. Reeds or bush serve the purpose. but less well.

Varieties of Seed.

It would appear that seed of Cavalla has grown most readily and best, while Salouk and Oriental have both proved quite good sorts.

Treatment in Seed-beds.

The beds are kept just moist until the seed sprouts, which may take from ten days to three weeks, according to the weather. The beds are then watered every day, before sunrise or after sunset, with a watering-can with a fine rose, held low so as not to wash the plants out of the ground. After the plants are well grown, the covering must be removed

by day, particularly during the last few days before planting, and watering must cease one week before planting, so as to harden the roots of the plants for their change.

The rate of growth during the first two months is very slow, but thereafter at the rate of about one and a half inches per week. A common fault is to sow too much seed. If the plants are dense, it is imperative that they be thinned out, but not before they stand threequarters of an inch high. This was a common failing, in spite of due warning at the farms in question, with the consequence that the plants were thin and lanky, and that from 25 to 30 per cent. died off in transplanting. Considerable loss occurred from inattention to this important detail of thin sowing.

Planting Out.

When strong enough, the tobacco plants are lifted out of the seedbed and conveyed in tins or baskets to the field, great care being taken to prevent the roots from drying in transit. Different distances have been tried, but that recommended for future use is drills 3 feet wide and plants 6 or 9 inches apart in the rows. These should run in the direction of the prevailing winds. This, while permitting of cultivation with the horse hoe, also produces tall straight stems with a large number of leaves of small but equal size.

In localities where irrigation is found necessary, a watering may with advantage be given while planting is proceeding, the water being led down small furrows adjacent to the line of plants. Elsewhere water is given at planting by means of a watering-can, so as to settle the ground well round the roots and give the plants a good start, a most important matter. At French Hoek no further watering should be given if seasonably planted. The actual planting may be done with spade or dibble, just as cabbages, onions and the like are put in. Backward, worm-eaten and weak, drawn-up plants are to be rejected

Treatment During Growth.

Once the plants are well established, and the rows readily discerned, the horse hoe may be passed through to keep down weeds and maintain a mulch on the surface, just as in the case of vineyards and orchards. Close to the plants, until the ground is adequately shaped, the soil should be worked by hand, using hoe or spade.

Just after planting the tobacco is liable to suffer from the attack of surface catterpillars (mest-wurmen). For these, trapping with baits of bran and treacle, examined daily, or poison, consisting of cabbage leaves, green barley or other green stuff steeped in arsenic in rings round the plants, or the use of such preparations as "vaporite."

Mildew did considerable damage to the tobacco in the experiments, mainly on account of the lateness of sowing By seasonable sowing and wide drills (3 feet), and by arranging these so that the wind shall blow along them, the trouble may be minimised. Damp-sheltered close situations are to be avoided. Should mildew appear amongst the tobacco, all leaves as attacked are to be pulled off and removed altogether from the field. If this is done promptly it will serve to check the spread of the trouble, while if neglected it is likely that the whole plant to the topmost bud will become diseased. It was with difficulty that the experimenters could be prevailed upon to practise the heroic remedy, and they suffered accordingly. In some cases, largely owing to delay, as much as half the crop was destroyed from this cause. In some cases, and contrary

to instructions, these mildewed leaves were threaded and hung up to cure, but, turning black and mouldy, they soon showed the error of such an attempt.

It is by such demonstrations that the value of rigid adherence to recognised methods is learnt. Mildew will be less likely to attack tobacco when planted earlier in wide rows running in the direction of the prevailing wind. Sulphur or dust, even if effective, would be calculated to damage the quality of the ultimate product.

If sown at the right time, and the flower heads undisturbed, very little trouble will be caused by suckers, but if planted out of season and in damp places these grow vigorously, and reduce the strength of the tobacco very materially. All suckers should be nipped out when between 1 and 2 inches long.

The flowers are on no account to be removed, as with ordinary tobacco. Such a proceeding would be fatal for the particular objects in view. When the plant is commencing to bloom, and the lowermost leaves beginning to turn yellow, the lowest 4 to 6 leaves should be plucked and removed from the field and thrown away; in fact in Turkey they destroy the lowest 8 or 10 leaves. This seems more than is necessary here. These leaves are weaker than the upper leaves, smoother and flatter, thinner and different in appearance to the remaining foliage. In the experiments some of these leaves were kept, but later on discarded.

About ten days to a fortnight after this operation the leaves commence to ripen.

Signs of Ripening.

The indications of ripeness are:—

(1). A yellowish tinge in place of the previous vivid green, commencing at the lowest and the oldest leaves, and most obvious towards the tip of each leaf.

(2). A limp feeling instead of the crispness of an unripe leaf.

(3). Translucency in place of the previous opacity when held up to the light.

On Cavalla and on other sorts, when grown on rich soil, yellowish spots appear on the leaves, and when these are clearly distinct the leaf is ripe. These signs of maturity are much more easily seen before sunrise or in cloudy weather as bright sunshine misleads the eye.

Accessories.

For the subsequent processes, the following articles are required, the numbers given being those for about one acre of tobacco, and with the addition of a baling press, to be referred to later, constitute all the materials requisite for the preparation of Turkish tobacco:

(1). Four needles; these are 14 inches long by about ½ inch broad, flat and smooth, with sharp points and dull edges, provided with a big eye, and should be made of good steel. They are made by Messrs. J. H. and E. Youle, Long Street, Cape Town.

(2). Six bushel baskets.

(3). One spray pump—knapsack or bucket type.

(4). 400 rods, 8 feet long. These may be light wooden spars, bamboo or stout reed, and must be of uniform length, that given being approximately a convenient size.

(5). A supply of canvas sheeting, bags or other material for protecting the tobacco from dew at night.

(6). A trellis. This is a simple matter, consisting of two parallel wires about 6 feet apart, supported on short stakes at intervals to pre-

vent them sagging, and carried along about two feet above ground and made fast at each end. The trellis wires should run across the direction of prevailing winds. A separate set should be provided for each grade of tobacco. Light spars with nails driven half into one side will serve well to prevent the tobacco-laden rods from shifting about when on the trellis. The site of the trellises should be some convenient sheltered sunny spot, preferably in a grass camp, but protected from wind and the prying attentions of livestock.

(7). The curing house proper may consist of any convenient clean, cool, and well-ventilated outhouse An empty wine cellar, coachhouse, hartebeests even, or loft under a thatched roof, will serve the purpose, the essentials being shelter from heat, wind, dust or rain, and preferably darkness. Lofts under corrugated iron roofs, stables where animals are kept, verandahs or lean-to sheds exposed at sides and front are to be avoided. Supports must be constructed to enable the rods of leaves to be hung up in tiers one above another with horizontal spaces of two or three feet between each set.

Gathering the Leaf.

In the early hours, besides the easier discrimination of ripeness, the leaf breaks off from the stem sharply without causing injury to the plant. In choosing, err rather on the side of over-ripeness than risk taking green leaves. For these reasons the leaf is to be harvested up till 9 a.m. in ordinary summer, and till about 11 a.m. on dull and cool days. Never under any circumstances gather tobacco within less than 24 hours after rain, as the leaf is apt to turn mouldy if this is done. Unripe leaves remain always of a greenish tinge, which is very objectionable, over-ripe leaves lose colour and strength. One or more ripe leaves are plucked from each plant, in no case over four at one time, from the lowest leaf upwards in succession. The leaves are plucked with the right hand, using the thumb above and two fingers beneath the leaf stalk, the main stem being held firm by the left hand. The leaves as gathered are placed evenly one on top of the other, and all facing the same way, in bushel baskets. Methodical handling at this stage facilitates subsequent treatment. It will require most of the remainder of the day to manipulate the leaves gathered during the early morning hours. If left over the day, fermentation is likely to set in. This happened occasionally (owing to pressure of other work) and these leaves turned black and had to be thrown away

Threading.

The baskets when full are conveyed to a cool shed or a sheltered and shady spot. The leaves are here assorted into two or more heaps according to size. Damaged leaves are set aside. If the leaves are properly assorted at this stage, and graded according to size, much time is saved at later stages, and a more uniform colour is secured. This matter can carcely be over emphasised. Ultimate price depends very much on attention to this one simple detail. In the experiments, those who neglected this matter were occasioned much labour and trouble at pressing time. The aim must be to retain the leaves as flat as possible. If the leaves vary in size the edges become folded and crinkled, and a ragged shrivelled discoloured effect is produced. The assorted leaves are picked up one by one and the stem pierced through by the tobacco needle at a point about one half inch from the base. The leaves are passed on to a thread of strong twine about 8 feet long. Care is taken to keep all the butts of the leaves at the same level. All leaves are caused to face the same way and are packed close together. One of the rods already spoken

of is laid along the threaded leaves and made fast at the ends, additional bands attaching the threaded tobacco to the rod at intervals of about a foot.

First Step in Curing.

The rods with their burdens of leaves are taken to the curing-house or loft above-mentioned. The rods are supported at their ends on rails or pegs, and may be hung in rows about 3 feet apart, and in tiers close one above the other. The aim is to let the leaves wither slowly and turn to a pale yellow colour without mouldering or decaying. Under ordinary conditions this process will occupy from four to five days if the leaves have been properly ripe before pricking. If there is too much draught, the edges of the leaves are dry, and shrivel instead of becoming faded and limp.

Second Step in Curing.

The tobacco is now ready for the next operation. The rods are taken out and placed on the above described trellises, the rods projecting one foot on each side of the two parallel wires. It is of the utmost importance that the tobacco is kept from touching or rubbing, and the rods from slipping along the wires. This is achieved by fastening the ends of the rods together by string or laying over their extremities a long spar armed with pegs or nails 3 to 4 inches apart, which serve to keep the rods in place. The first day the rods are kept 2 inches apart, the tobacco being close but not touching. The tobacco is brought from the curing barn after the dew is off the ground, it is covered by bags or canvas sheets from the midday sun, exposed again in the afternoon, and covered at dusk to keep off the dew. The second day also it is covered at midday. In the event of rain threatening, all leaf hanging outside must at once be brought in under cover and hung up singly, not touching, and not taken out till the weather is perfectly clear again. The tobacco must be covered without fail every night, dew or no dew, else loss will result.

The intention of these various manipulations is to expose the tobacco gradually and prevent sudden or too rapid drying. Every morning after sunrise the covering should be removed. After the first day the rods should be laid from 6 inches to 8 inches apart to allow the sun to play upon the rows of leaves. The leaves now gradually change from a pale yellow to a warm brown and become dry to the touch This process takes usually from 8 to 10 days, varying with the weather, and when completed the leaf is quite dry, but the midrib is still slightly damp and pliable.

Third Step in Curing.

The rods are now removed from the trellis and laid on the grass or on clean sacking, each one singly, and allowed to remain in this position the whole day. At night they are laid together in a pile one above another and covered with bagging to keep them free from dew. The following morning the sacking is removed, the tobacco again laid out, but turned so as to expose the other surface of leaves to the sun. This is continued for a few days, four or eight perhaps, till a golden brown colour is attained, and the centre of the leaf is perfectly dry and the midrib hard and brittle.

It happens sometimes that having been plucked a trifle green, or from some other cause the leaves do not colour properly. In such cases

they are to be just damped with pure water applied as a very fine mist through a spray pump while the sun is shining on the leaf. One day the one side exposed is sprayed, next day the other. This is repeated till the desired hue is obtained. Spraying is not in every case necessary, if the proper colour is acquired without it. The rods with their burdens of dry tobacco leaves are now brought to any convenient cool storehouse, and there packed in stacks on a wooden floor on planks and covered by sacking to exclude dust and air. In this state the tobacco may be kept till a convenient time for pressing. As tobacco is very liable to take up smells of all kinds, no onions or other strongly scented things must be kept near it. In making these heaps a little water may be gently sprayed over the leaf as each rod is laid down. This permeates the whole mass and makes it soft and elastic.

The Baling Press.

Probably any hand baler might be adapted to the purpose of pressing the Turkish tobacco into the form in which it is customarily put onto the market, but one specially designed for the purpose is a material advantage, and can be improvised at small cost.

A stout wooden platform 2 feet by 6 feet is required. Near one end the two uprights are erected, joined together by a cross piece, in which a worm and vertical screw is affixed, or other device for exerting a pressure downwards may be arranged. The press proper consists of a box 2 feet by 16 inches by 2 feet, which slides in and out under the press. One end is fixed to the floor; the other end and sides are attached by hinges, and a wooden frame fits round the top to keep the sides in position. The lid consists of a flat piece fitting just inside the box, and when in operation the pressure is exerted by the screw upon this lid. At any time either side or the one end may be opened without disturbing the rest, and the progress of the pressing process watched and controlled. For the purpose of these experiments a baling press was made by Messrs. D. Isaacs and Co., of Cape Town, and was found to do the work admirably.

Fourth Step in Curing: Baling.

Pressing may be undertaken at any convenient time after the conclusion of the drying processes. The operation is best carried on in wet weather when the leaves are supple and elastic in the tack. If the weather is fine and the material is dry and crisp, then twenty-four hours before pressing the rods are to be lifted one by one and sprayed very finely with water on one side only and re-stacked and covered. The leaf then becomes soft and pliant. If too much water has been used they will ferment in the bale and become mouldy. The strings are now cut loose from the rods and cut into lengths corresponding to the size of the bale. The tobacco is packed in layers, the butts all turned outwards and the tips towards the centre. When half full the lid is put on, and pressure applied for a quarter of an hour or so. The box is then filled up, and for three or four hours pressure is repeatedly applied, the sides of the box being opened to inspect progress. The usual weight of a bale is about 80 lbs. Ultimately the bale is removed and stitched up in canvas, the ends being laced together, leaving the tobacco at the ends visible.

In this condition the leaf improves much with age, tobacco coming out of the bale a year or several years old being very much superior to the new immatured article.

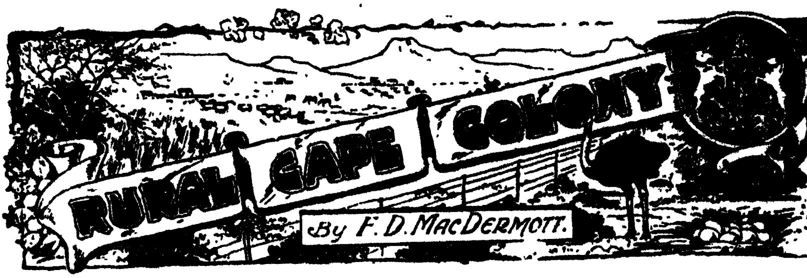
In Turkey while maturing the bales are turned over every day, much as is the custom with ripening cheeses.

At the sale three parcels secured respectively 3s., 3s. ½d. and 3s. 2½d. per pound, while other lots fetched 2s., 1s. 6d., 1s. 5½d., 1s. 1½d., 1s., and bottom leaves and inferior stuff from 9d. downwards. The total weight sold was 3,232 pounds, and the receipts amounted to over £230, or an average of about 1s. 5d. per pound.

The labour involved, while not arduous, yet requires some little skill, and above all constant attention to detail. Women and girls can be advantageously employed in much of the work. Slight differences in quality materially affect the price, so that skilled supervision is essential and profitable. As yet only a few have learned how to treat the crop and to manipulate the leaf, and even they have still something to learn. Written words must fail to make fully clear the appearances at various stages or to teach that skill in handling which must be seen to be appreciated. Demonstration is the only practical means of instruction. The necessity for this word of caution will be at once realised by all practical men, especially by growers of tobacco.

The chief matter that now remains to be ascertained is what other soils and climates besides those similar to the French Hoek Valley are adapted for Turkish tobacco.

The sandy, damp soils of that part, where even poor newly broken up sour veld manured with sheep dung has given excellent results, are commonly met with among the mountains of our south-western districts and along the south and west coasts. Many other localities deserve also to be tried, although the Turkish tobacco cannot be expected to be equally successful everywhere. From different parts, no doubt, different flavours will be obtained, while it is quite to be expected that Cape Turkish tobacco will develop characteristics of its own, distinct, perhaps superior, perhaps not quite so good, as that from Turkey itself.



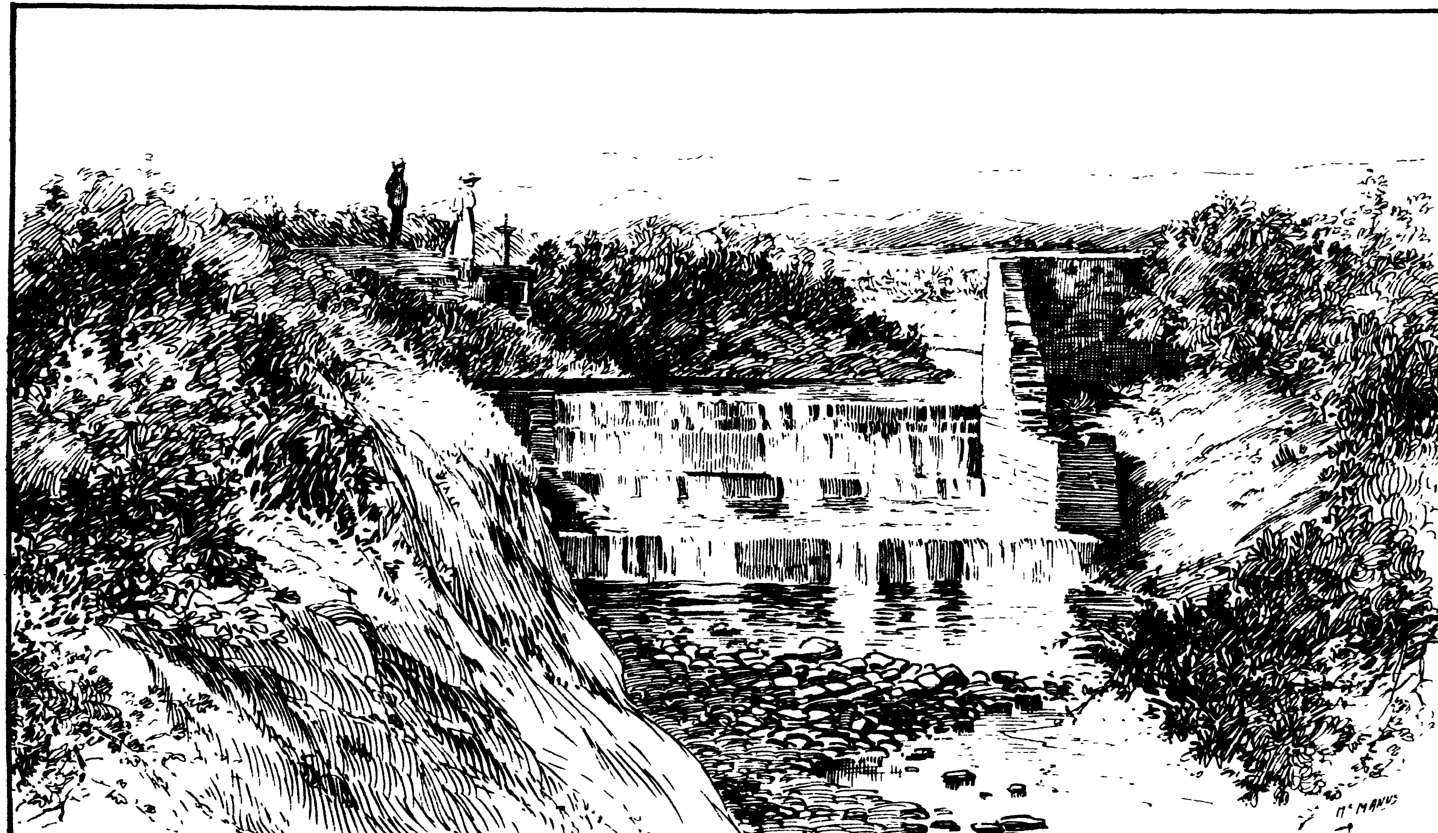
No. XXVI.

(*Continued from Page 66.*)

In the last issue, in dealing with the Middelburg District, an illustration was shown of that great Colonial sire, "Pearl Diver," and before going any further I must call attention to an error in the inscription which accompanied the plate. It is there stated that "Pearl Diver" stood at Mr. C. Southey's farm "Culmstock," for 23 years. This error is so obvious, to anyone who knows, that correction is scarcely necessary, but as there are a good many who do not know, I may state now that he was brought out in 1893, and died at Culmstock in June, 1906, at the age of 24½ years. The 23 must therefore be read as 13. "Pearl Diver" was by "Master Kildare," a noted Irish horse, out of "Three Pearls," by "Rosicrucian," and was bought by Mr. C. Southey from Sir Walter Gilbey. I have described him as probably the greatest thoroughbred sire that ever came to South Africa, but I believe that no other horse can show such a record as his in South Africa. His stock won the Port Eliabeth Derby for six years running, also the Johannesburg Nursery Gold Cup. And he could claim even greater successes than these, for he was the sire of the only two horses bred in South Africa which were good enough to win races in England. "Pearl Rover," by "Pearl Diver," out of "Mrs. Veal," won the Temple Handicap at Sandown Park, the principal race of the day, by three lengths from a very good field, including "Deep Sea" (another "Pearl Diver" bred in England) and the crack American mare "Sandia." "Pearl Rover" also won the Peel Handicap at Newmarket. "Pearl Diver" was the sire of "Camp Fire," the fastest horse in South Africa over five furlongs, and who won the Flying Handicap at Newmarket (five furlongs) in 59 4-5th secs. He was undoubtedly a great horse, and his loss was as severely felt by his owner as though he had been one of the family.

At "Culmstock," Mr. Charles Southey's Farm.

As I have managed to convey the fact that "Culmstock" was among the few farms I had time to visit during my rather hurried trip in the Middelburg District, I may as well now attempt to give some of my impressions of that property. It is now very generally known that "Culmstock" lies on the Brak River, immediately to the south of "Varkenskop,"



THE UPPER WEIR ON THE BRAK RIVER AT "CULMSTOCK."

PRIZE WINNING RAMBOUILLETS AT "DROOGEFONTEIN."

the property of another energetic member of the same family, Mr. W. R. Southey. The Rooispruit, another watercourse of an intermittent character, which runs into the Brak River, also passes through a portion of this property. To get something like an adequate notion of the whole conditions, it must be pointed out that the main source from which the water supply for this farm is obtained is from the Brak River that comes down from the mountains above Schoombie. This is joined by the Rooispruit, which has its source in the mountains beyond Naauwpoort, and brings down the flood waters for long distances when it flows. These two form, together with the Thebus River, which joins them below Culmstock, the Great Brak River, which flows into the Great Fish River close by Fish River Station. The Little Brak River is a different stream, which rises in the country above the town of Middelburg, flows past Tafelberg, and running almost parallel with the railway, joins the Great Brak River some miles above the spot where that stream joins the Great Fish River. I mention these few facts to give a rough idea of the drainage area which contributes to the water supply which has made the properties in this vicinity so valuable.

But these favourable conditions would have been of little value without the energy, courage and foresight of those who have taken upon themselves to do the heavy pioneer work involved in bringing these flood waters into use. To take the one instance of the uses made on the "Culmstock" property by some of the waters which come down at intervals from the Rooispruit. This stream in its natural condition brought little or no water to the upper or more northern parts of the farm. But to render it of service, a long and deep furrow has been constructed which must have entailed an enormous amount of work in order to make the floods available. This furrow is cut into the banks right down to the bed of the stream, it being found that these streams have in time past built up the banks against themselves as it were. In one of the illustrations herewith this cutting is shown as seen from the dry bed of the spruit. The furrow that is led out here runs for some five or six miles in all, and serves the very useful purpose of turning the flood waters out over the veld, and thus conserving moisture in the soil to percolate through gradually and help to maintain the land in better condition, as well as supplying reserves which gradually find their way into the Brak River in the form of drainage. This work alone can be classed as one of the great efforts of the South African farmer in his continuous struggle against the natural conditions prevailing.

The Weirs on the Brak River.

Among the other illustrations herewith will be seen those which show the diverting weirs on the Brak River. The first or upper weir is a very solid structure of concrete and masonry, and was not built without a good deal of trouble and some disappointment. It will be generally recognised by now that these shallow valleys contain heavy deposits of alluvial silt, and in some places this silt is so deep as to make it almost impossible to find solid foundations for such works at reasonable depths. At the spot where this weir is constructed, these conditions prevail to a marked degree, and great difficulty was encountered in its construction in consequence. Not only was there this difficulty of foundations to overcome, but when the weir was built, serious troubles began to arise almost immediately as the floods were constantly washing out the river bed below, thus endangering the whole structure. In fact once, I believe, the weir was carried away. To overcome this ever threatening danger, Mr. Southey has constructed concrete sills, one on the lower face of the wall, and one some little distance below the weir. The one on the wall breaks the force

of the floods as the water comes dashing over the weir, and the one in the river bed below the weir serves as a miniature dam which, by holding a portion of the water constantly below the weir, forms a water cushion to counteract the eroding action of the floods on the river bed. The present weir has stood the test of some time, and the recent heavy flood seasons, so there seems little reason to suppose that this particular problem has not now been solved. The water is led from the stream above this weir through iron sluices into the main furrows which serve the major portion of the irrigable part of the farm.

The lower weir shown in the illustrations herewith is not nearly such an ambitious work, nor could it have proved so troublesome in building. It is constructed just above the drift which crosses the river on the road to the railway station at Schoombie. Here the foundations were sound and reliable, and the river broadens out so that the work could be carried out in the ordinary way. This weir also helps in the diversion of water for irrigation and flooding purposes, serving some parts with more facility than the upper weir would.

The General Aspect of the Property

is that of a broad valley, through which the river winds its way. In the old days this stream used to wander where it listed, but as this tended to waste, it has been found necessary to confine it to given channels and even to divert it in some cases in order to make the most of its waters. This work has been carried out at some cost in the past of time and money, but it has been found to more than repay the outlay. The fringe of the hills which lie all round Culmstock have the ordinary characteristics of the Karoo. The veld is good and there is grazing for large numbers of stock independent of the crops raised under irrigation. The main crop is, of course, lucerne, and of this Mr. Southey has now some two hundred acres fully established, and is extending his lands every year. One of the sights of the farm is the huge stacks of lucerne hay dotted about in the paddocks.

The seasons being favourable, a good deal of work in the direction of further extension was going on while I was there. It will be interesting to many growers of lucerne to learn the methods which Mr. Southey adopts in laying out his lands. He is not content with doing as others do, that is taking great care to thoroughly cultivate and create a fine loose tilth before seeding the land—that is, of course, after levelling—but also rolls the seed in with a corrugated roller. This he finds has an excellent effect on the young plants, and in his circumstances acts beneficially. But then everything is done so thoroughly on "Culmstock" that it is not surprising to find really up-to-date farming of this description. Even the furrows are protected where necessary with cement work, and all the buildings and appurtenances of the place are in good condition and kept in apple-pie order.

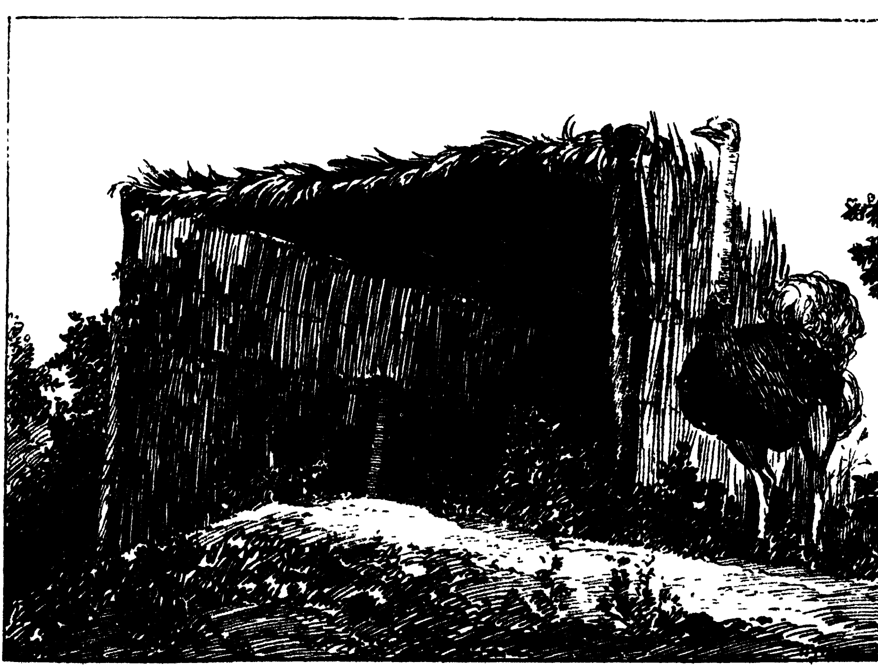
The Culmstock Stud.

To come to the stock, the main feature to most people of general interest is the thoroughbred horses, and of these one can see as fine a collection as could be desired. The Culmstock Stud is famed throughout South Africa, and needs little praise here, all that can be done in an article like this is to mention in a general way a few of the features. Of course, the stallions are stalled, and so are some of the youngsters, but the mares are run continually in lucerne paddocks, and one of the prettiest sights I have seen for many a day was the fine collection of aristocratic matrons placidly grazing, and in the pink of condition, as perfectly happy as animals could desire.

Since the death of "Pearl Diver" Mr. Southey has had one or two other strokes of bad luck, but he seems to have got through that particular streak, for the moment at any rate. Among other horses he had recently at "Culmstock" was "St. Fillian," and he died on the farm after only one season. He has left some promising youngsters behind him, however, and among these Mr. Southey showed me a very nice yearling bay colt out of "May Queen"; another was a chestnut filly, also a yearling, by the same sire out of "Mrs. Veale," by "Robert the Devil," out of "Ciploana," the winner of the Oaks. "Patron Saint," is the stallion now in use there, and he is a fine upstanding horse, of 15.3, showing great quality. He is both symmetrical and substantial, and looks to be very powerful in the hind quarters. He is by "St. Frusquin," out of "St. Helen," by "Springfield." Among the mares was one nice chestnut by "Wroughton," with "Apple Blossom," and "Grace Trenton," all of long lineage, and with some of the best blood of England in their veins. The condition of the yearlings speaks volumes for the stud methods, for they are all, without exception, wonderfully well grown out for their ages, and give promise of fully maintaining the reputation of "Culmstock."

In the Ostrich Paddocks.

Turning to another prominent side of the farming we find ourselves in the ostrich paddocks. Here again is stock of the best, for Mr. Southey is as particular about his birds as he is about his horses, in fact the same may be said of all the stock on the farm. He has a fine troop of birds, and all of the best strains One beautiful cock, "Black Prince,' he ori-



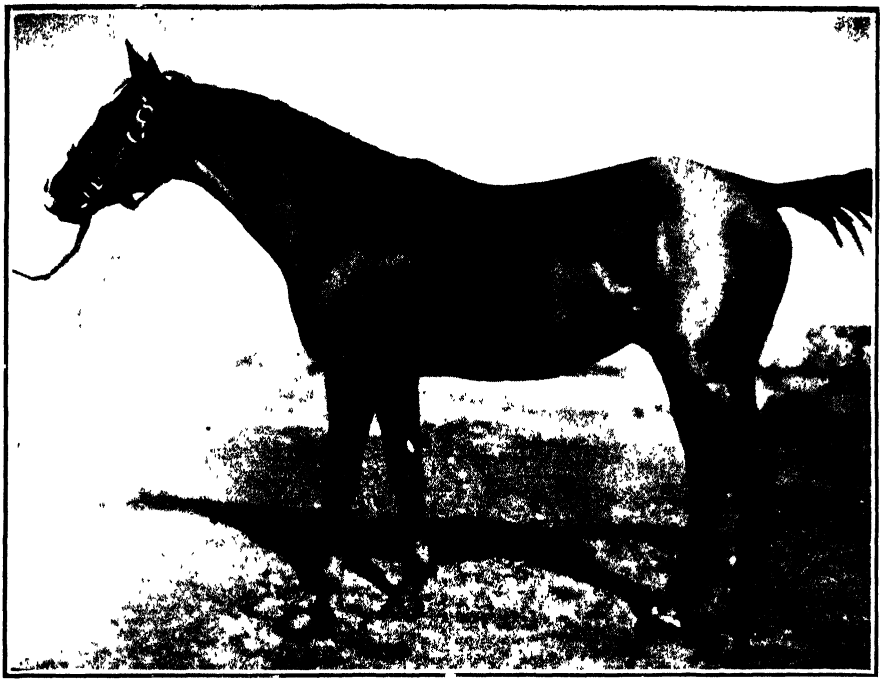
ginally bought of Mr. O. E. G. Evans, of Bedford, whose "double floss" birds are now known from one end of the country to the other. "Grapes" is another fine stock bird, as also is "Premier," who is mated with a beautiful hen named "Uncrowned Queen." The care of the birds is in keeping

with everything else on this property, and they are given every attention. They are grazed in extensive lucerne paddocks, with separate camps for breeding birds. One feature of this side of the farm caught my attention as out of the common, and that is the construction of shelter huts for the nesting birds. With this is shown a sketch which gives some idea of this particular contrivance. At first I could not believe that the birds would take kindly to so high a form of domestication, but Mr. Southey assured me it has proved most successful. The huts are constructed of branches and rough grasses for thatch, and serve the very excellent purpose of protecting the sitting birds from the extreme heat of the sun in the daytime, from rain in case of a storm, and from the cold at night. It is not very easy or safe to approach too close to birds when they are nesting, so I had to be content to take what sort of a snapshot I could get from a distance, and trust to having a sketch made afterwards. Unfortunately the bank of an irrigation furrow intervened, and it is only possible to suggest the presence of the hen bird on the nest by showing her head and neck as it appeared above the bank, but the sketch should be sufficient to give a fairly good idea of the whole contrivance. It was almost amusing to watch the cock bird standing like a sentry at his box, and occasionally marching up and down to see that all was safe and clear. But the amusing element soon merges into admiration when one realises the utility of the arrangement, and what a difference it must make to the comfort of the birds themselves. It is unnecessary to say more of this part of the farming operations, as Mr. Southey's pluckings are well known to the buyers of Port Eliabeth, and the financial results obtained speak far louder than words. I may mention, however, on the authority of Mr. Southey himself, that his present fine troop of birds has been built up almost entirely since the war. During the hostilities he lost practically the whole of his original flock, and as he had to start again he determined to have the best obtainable.

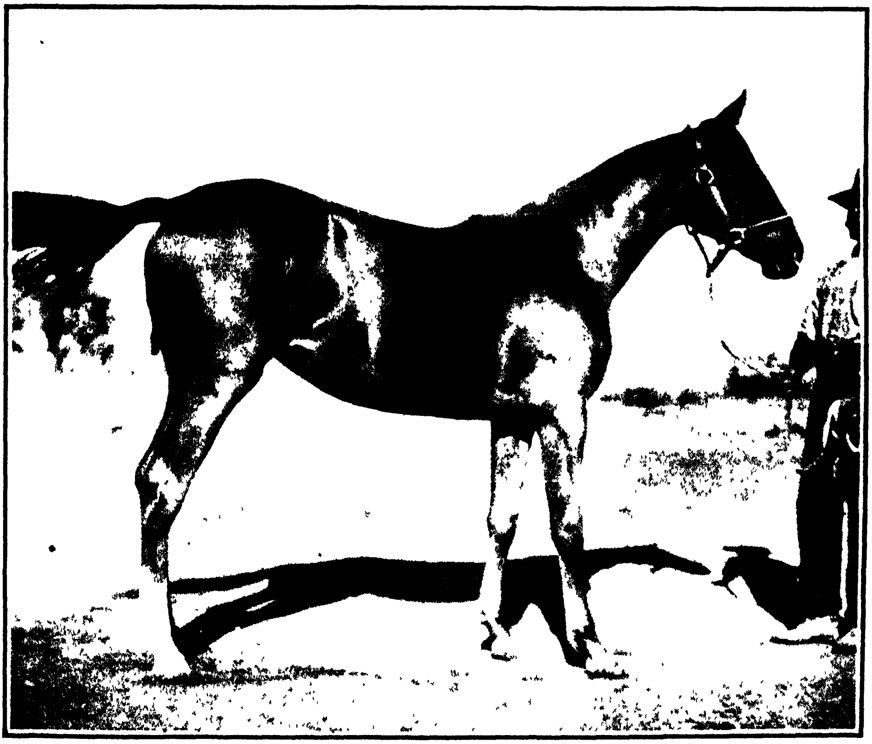
Just a few words more and I shall be finished with "Culmstock." The whole of the farming is practically made subservient to stock. In addition to the points I have mentioned, a large herd of cattle is kept, of the Lincoln red type. Of course, there are also small stock, and among these is a nice flock of Oxford Downs, which Mr. Southey speaks very highly of. They seem to do very well here, and he prefers them to any other English breed. The homestead, of which a view was given last month, is very substantially built, and larger than it looks, while the stables, loose boxes and outbuildings are not only substantial, but kept in excellent order. In fact, one might almost go so far as to say that "Culmstock" is a model Karoo farm. There is plenty of foliage about, but not sufficient to break the glorious view all round, and the garden side is not neglected, as the neatly kept grounds indicate. Fencing is an indispensable part of such a system, and in this case it is both sound and plentiful.

A Middelburg Farm in the Making.

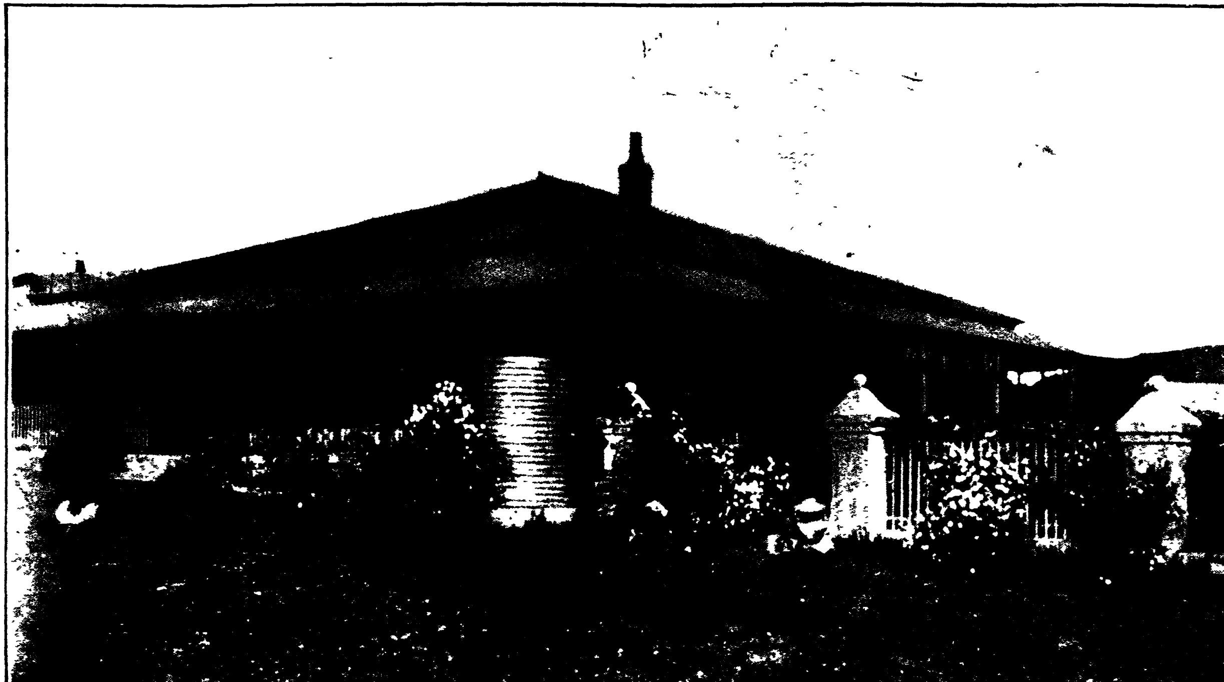
Having seen so much, I found I had just time to make another call before catching my train back to headquarters, so I crossed the railway at Schoombie, and following up the valley of the Brak River, I reached the farm of Mr. W. J. Edwards, where I had the pleasure of a glimpse at a Middelburg farm in the making. Those I have hitherto described have got fairly started beyond the pioneer stage, so to speak, although there is still a tremendous amount of work to be done on all of them. But here I found myself with a man in the very midst of his pioneer work, and it was a most interesting experience, as showing the remarkable qualifications which such men need in order to compel success. One hears a great deal about the necessity of capital for the development of agriculture in South Africa, and capital is undoubtedly wanted, but when one sees what



Mr. Chas. Southey's Thoroughbred Stallion Patron Saint



A "Culmstock" Yearling Thoroughbred by "St. Fillian."



THE HOMESTEAD OF MR. W. J. EDWARDES AT 'DROOGEFONTEIN'

has been, and is being, done in places like this by means largely of sheer hard work, indomitable courage, patience and foresight, one cannot but feel that capital is not everything. Mr. Edwards' farm, "Droogefontein," is situated much higher up the river than the Southeys, and he has not all their advantages of situation and soil. Yet he is succeeding in gradually bringing order out of chaos, and in addition to his ordinary farming operations, is also developing and conserving the water supply until he is now on the brink of doing what his neighbours lower down have done. The farm covers an immense area, some 9,000 morgen, and the greater portion of it is the usual mixed Karroo veld. He has more mountain veld than those lower down the river, and this is a good stand-by for his stock, but he has not the large stretches of irrigable land which they possess. Still he is quite content with what he has, and is steadily pegging away with his schemes of utilising it all in the best possible way. The land slopes more steeply towards the river bed, and it is only in the lower part of this valley that he can bring much of it under water. For this purpose he has built a lengthy diverting weir across the bed of the stream—shown in the illustrations herewith—by the aid of which he is now laying out a goodly stretch of arable land. In addition to this he has availed himself of a personal gift which should be cultivated by all farmers in such semi-arid regions. He found some time ago that he could wield the mysterious water-finding twig which puzzles the scientists. And so successful has he been in his water-finding operations that he has now full confidence in his powers. Certain it is that he has developed waters in some rather unlikely looking spots, and has windmills gaily supplying him in paddocks which would have been otherwise unusable.

A really striking feature of this property is the attention which has been devoted to fencing. Mr Edwards holds an implicit belief in netting. He has some large flocks of excellent merinos of the Rambouillet strain, and as he values them highly he is taking every possible care to guard them against the depredations of the jackal. In order to effect this he has put up many miles of jackal-proof fencing, carefully constructed and packed well with stones below so that not even the most ingenious and enterprising of these depredators has much chance of making his way through it. To give an idea of the thoroughness with which this work has been carried out, it should be only necessary to mention that on entering the farm one has a drive of upwards of a mile through an avenue of netted fencing. The road on both sides is completely enclosed, and large and small paddocks are also being formed all over the farm with the same material And the best of it all is that it pays, and pays well. The sheep are in better condition, they have not to be driven about and kraaled, the veld is the better for it, and the labour charges of the whole farm are considerably reduced. There can be little doubt, after seeing a farm like this, as to the future. It means that jackal-proof fencing has come to stay, and the day cannot be far distant when every farmer in the country with small stock to protect will spend his last penny on this form of insurance.

THE "DROOGEFONTEIN" LINCOLN RED SHORTHORNS.

The main feature of the farm is stock, of course, and these consist principally of cattle and woolled sheep. The "Droogefontein" herd of Lincoln Red Shorthorns is excellent now, and if Mr. Edwards continues on the lines he is following it should soon be making a big name for itself. He has now on the farm a fine specimen of this well-known breed in the person of the bull "Burton Rover, which he imported from England. This bull was bred by Mr. John Evens, of Burton, Lincolnshire, and is by "Red Rover," out of "Red Rose," an excellent dairy strain.

"Red Rose" was a winner no less than 23 times, including American trials, while "Red Rover" was first at the London Dairy Show. The record of the dam of "Burton Rover" with her third calf for 308 days' milking was given as yielding 9,242 lbs. of milk, or an average of 30·0 lbs. per diem. In addition to this Mr. Edwards had the honour of winning the championship for cow and calf at the Bloemfontein Show this year with pure-bred stock bred on the farm, while three of his heifers came second at the same show, beating Lord Lovatt's entry. He also took first and champion at Bloemfontein in 1906 with one of his pure-bred cows, and came second at Port Elizabeth the same year. So that he has already a good deal to be proud of, and with care should soon stand in the forefront of our cattle men. In merino sheep, too, he has done fairly well at the shows. This year he was successful in winning a first for a pen of two-tooth rams at Bloemfontein, while he came second at Bloemfontein and first at Port Elizabeth with another pen for the Karoo Veld prize.

I merely mention these details to show incidentally that these farms are naturally favourable to the rearing of good stock, if they are only properly handled. And it must occur to anyone reading these particulars that if such success can attend farming operations in the conditions that now obtain, how bright must be the promise of the future when such properties are developed to their full extent. I can only add that at "Droogefontein" the same scrupulous care is noticeable that I have mentioned as prevailing on the other farms. Nothing is scamped. The buildings are substantial, and there is an air of solidity and prosperity about them all which is most encouraging. Even the cattle kraals are well-constructed of stone, and tree-planting for the purposes of ornament is carried on as far as the peculiar conditions will admit. The comfortable homestead, with its neat and fruitful garden and small orchard in front, is prettily situated, commanding a fine view of a bulky steep kopje in the foreground, and the whole of the valley below, so that there is no need to stray far for scenery. The steading is compact and well arranged for utility as well as careful farming, and in fact there is very little indeed to be seen here that cannot be praised. My only regret is that I could not stay longer to see more of such farms.

A Few Reflections.

In conclusion, it is impossible not to be deeply impressed with the possibilities which seem so prominent in such a district as this. One only has to take into consideration what has been done by individuals on these enormous properties, and try to imagine what might be done in the future when the labours, the worries and the expenditure will be more divided. Take "Culmstock," with its 7,000 morgen of land, and a possible 600 to a thousand acres of arable land which can be brought under irrigation. It is more than any single individual could hope to cope with at its full capacity. Then think of a property like "Droogefontein," with its 9,000 morgen or thereabouts, and all left to one man to develop? The task seems Herculean, especially when it is recognised that before even an appreciable proportion of the possibilities can be worked up it must take years to bring the water supply to a satisfactory condition, and make the farm equal to carrying what it undoubtedly must in the times to come. On "Culmstock," for instance, the water question has been practically solved, yet there remains a tremendous task yet to be accomplished in preparing lands for permanent crops such as lucerne. These facts all point to the absolute necessity of considering the all important question which is beginning to impress itself upon many of our farmers, and that is the advisability of calling in more assistance in the work they have in hand, in the shape of more and better farmers. The only prospect before the man

who would to-day decide to cut up one of these properties into smaller holdings would be that of probably getting men on to his lands who would not see as he does. But the day must come when the better class of man will be available, and it would be as well if some of the more thoughtful among those who have so bravely and effectually carved out the way in the wilderness could hit upon some plan by which the full fruits of their great labours could be assured to posterity. This can only be done by interesting our younger people in the methods which have brought success, by holding out the prospect of themselves having a possible chance of taking part in such work, even though on a smaller scale than that which has enabled the pioneers to advance. The farmers of the future are the boys of to-day, and it is to them that the country has to look for its permanent prosperity. The sooner they can be initiated into the methods I have described, and given a hope of sharing them in the fulness of time, the sooner will some of our pressing economic problems be brought within measurable distance of final solution.

JOHNE'S DISEASE.

(CHRONIC BACTERIAL ENTERITIS OF CATTLE, PSEUDO TUBERCULOSIS.)

By R. Paine, F.R.C.V.S., M.R., San. I.

Whilst studying in England during the last six months, my attention was drawn to some recent research work which had been carried out upon this desease, and since I have, within the last two years, encountered cases of it in the Western Province, a few brief notes may be of interest and value.

There is no occasion for any undue alarm or for stock farmers to imagine that a new disease has been discovered in the Colony which will incur wholesale losses amongst cattle; but, while no such condition need be feared, annoying losses may be avoided by the adoption of preventive measures. Once the disease is on a farm, provided the local conditions are suitable, cases are very apt to crop up persistently in the herd, and, as will be seen later, these cases are invariably fatal in the long run. Animals affected by this disease are commonly known as "Piners," "Skinters," or 'Wasters."

Occurrence of the Disease.

The disease, described by Johne in Germany in 1895, has been observed in Belgium, Holland, Switzerland, Denmark, and Great Britain (by Sir John McFadyean in the last country).

Dairymen from the British Isles will readily recognise the symptoms which are commonly seen in all breeds, but in this country I have only encountered them in the Jersey breed so far.

It is stated that the period of incubation may cover months or even years.

Symptoms.

In the early stages the animal feeds well, but does not thrive as it ought to do. The dung is inclined at times to be rather loose, the coat begins to stare, and there is a gradual loss of condition, followed later on by a most persistent diarrhœa, which gets worse and worse until nothing but a discoloured fluid is being continually passed.

In some cases the diarrhœa may cease for a week or two, but recurs with increased severity; this is accompanied by a rapid loss of condition; the animal gradually loses strength until finally it is unable to rise, but even

up to the end its apetite remains fairly good. Rumination goes on and the temperature remains normal. Unless the animal is destroyed, death occurs from emaciation after an illness which may extend over several months.

Post Mortem Lesions.

To the untrained eye there is absolutely nothing to be seen upon opening the body except a very emaciated carcase. All the organs appear to be normal, but if the bowels be carefully examined, one will observe that their coats are thickened and that the lining membrane has an abnormally coarse and wrinkled appearance. There is no intense inflammation, but merely a condition of congestion which may extend throughout the small and large intestines. The lymphatic glands (kernels) near the intestines are enlarged, and have a watery appearance when cut.

Now, if the bowel be examined microscopically, we find that the whole of the lining membrane is more or less destroyed, and that its glands, which normally secrete the juices to digest the food, are functionless, so that neither can the food be digested nor the nutritive material in the bowels be absorbed into the body. This readily explains the condition of chronic indigestion and loss of condition.

Further, it is easy to demonstrate that the actual cause of this condition is a little organism (bacillus), which is present in innumerable numbers in the lining membrane, and, strange to say, these bacilli are very similar in shape, size, and staining reactions to the bacilli of tuberculosis (consumption). They can, however, be readily distinguished from the latter by the totally different lesions which they give rise to, and several other laboratory methods.

Unfortunately, both varieties of bacilli are similar in the strong opposition which they give to medicinal agents.

Treatment (Curative).

Treatment is almost invariably hopeless. Occasionaly cases will give a temporary response to drugs, but the diarrhœa usually recurs within a week or so. Mossu, writing about chronic diarrhœa in cattle, was undoubtedly referring to Johne's disease when he said " All the drugs usually employed against diarrhœa, the antiseptics, astringents, etc., fail or confer merely momentary benefit. Economically, nothing is to be gained by keeping the patients alive. With great care existence may be prolonged for months, or even for several years, but the animals never regain condition and are never of any use."

One animal, which I treated under the advice of the late Dr. Hutcheon, was observed to be losing condition on March 15, 1905. She was put under treatment, and on May 20, 1905, diarrhœa was first observed. It persisted off and on until September 20, 1905, when she was so poor and weak that her destruction became imperative. During this period she was under daily observation, and medicine was administered on an average twice a day without obtaining any permanent effect.

Amongst the drugs commonly employed are the following:—Opium, Chlorodyne, Alum, Tannic Acid, Gallic Acid, Chalk, Catechu, Stockholm Tar, Carbolic Acid, Lysol, Thymol, Salol, Ergotin, Arsenic, etc. Only the most easily digested diet should be allowed, such as milk, eggs, flour gruel, etc.

PREVENTIVE TREATMENT.

Investigations are still being carried out to determine more facts with reference to the life history of the bacilli, our knowledge at the present time being far from complete upon the subject. Still we know that the dung of diseased animals contains large numbers of the bacilli, and general opinion holds that animals are chiefly infected by swallowing contaminated food or water, so that preventive measures may be based upon these points.

As soon as a case occurs it should be isolated, but probably it will be more economical to destroy the animal at once. All grazing and dams likely to be contaminated should be avoided, and, if feasible, it is a good plan to plough up infected pasturage and crop the land. All dung and bedding from infected animals should be destroyed.

It is also wise to isolate all newly-purchased stock as far as is practicable until sure they are healthy before mixing them with the rest of the herd. This precaution is naturally of value in the prevention of other diseases such as Contagious Abortion.

Sir John McFadyean has suggested that a test may yet be discovered for the disease of a similar nature to that used for Tuberculosis. Should this fortunately happen, we shall be in a position to pick out cases in the earliest stages and eradication of the disease from herds will be more feasible.

CASTOR OIL (*Ricinus Communis*).

By R. W. THORNTON, of the Agricultural Department.

There are a great number of varieties of the castor oil bush. In India, where much castor oil is produced, two chief kinds are known: (1) a perennial bushy shrub or small tree with large seeds, which may yield 40 per cent. or more of an oil used chiefly for lubricating and illuminating purposes, and (2) a small annual plant grown as a distinct crop, and yielding small grey seeds with brown spots. These seeds contain about 37 per cent. of oil, the better qualities of which are used medicinally. The perennial varieties grow with great rapidity, and a year's growth will often produce a tree 15 to 20 feet high, with a corresponding growth of foliage, branches, and stems.

The oil content is a most important point to determine, but the crux of the whole problem lies in the feasibility or otherwise of collecting what seed there now is in the Colony, and thereby to induce farmers and others to produce sufficient quantity to justify the employment of a small plant for expressing the oil.

That the castor oil plant grows to perfection in many places is common knowledge, indeed it is common alike in the East and the West and from the coast to Bechuanaland. The measure of the demand for the oil and the ruling prices are also known. It only remains to grow the article on a large scale, for the farmer to be assured of his market and the manufacturer of his supplies.

EXPERIMENTAL GROWING OF CASTOR OIL.

The following varieties have been experimented with at the Knysna and Robertson Experiment Stations:—

Ricinus major, *R. sanguinius*, *R. viridis*, *R. Zanzibariensis*, *R. Gibsoni*, *R. minor*, *R. communis*, *R. Africanus*, and *R. Barbon arborens*.

At Knysna all grew well to a height of 6 or 7 feet, and bore seed. *R. Zanzibariensis* grew very rapidly, attaining within a few months a height of over 9 feet.

In June the fruit was gathered. That of the last named, though at first sight apparently good, was found to be quite empty, the endosperm having failed to develope. *R. major* and *R. sanguinius* produced much more fruit than did the others, which may accordingly be discarded. The plots were too small to admit of any estimate of the yield per acre being formed, but only these two varieties appear to deserve further attention.

In similar trials at Robertson, *R. sanguinius* did by far the best, giving much more seed than any other sort, and the fruits remained closed and on the plant longer, but when artificially treated yielded the beans more easily than the others. The endosperm was well developed. the seeds being heavy and glossy.

R. major did moderately well also.

R. Zanzibariensis gave somewhat better results than at Knysna, yet a large number of the seeds were empty, while many were poorly developed, light and dry, and not worthy of further sowing.

None of the remaining sorts tried commend themselves.

Experiments with the first named are being continued.

The common sorts found so frequently about the country appear to be *R. major* and *sanguinius*, and *minor*. A sample of wild castor collected at Robertson compares well with that experimentally grown.

Soil and Climate.

The soils most suitable to the growth of this crop are alluvial soils and rich, well drained, sandy and clayey loams; light, loose sandy and heavy wet soils must be avoided, though the plant being of a hardy nature thrives in almost any situation, dry soils on the whole, however, being preferable. The climatic conditions most suitable are warmth and fair summer rainfall, though the plant will exist and mature in comparatively dry areas. In India frost is regarded as fatal, yet it is found throughout South Africa. in regions where winter frosts are severe.

Preparation of the Land.

The land should be well prepared, deeply ploughed, and subsequently harrowed. This is necessary, as the plant makes an enormous root growth in a short space of time, and hence requires a deep and well-worked soil to facilitate the rapid and unopposed spread of the root system.

Cultivation of Crop.

About 10 lb. of seed is required to sow one acre of ground. The seeds should be placed in hot water prior to sowing, and should be left to soak for 24 hours, and then be planted in rows from 4 by 4 to 8 by 8 feet apart both ways according to the variety, two or four seeds are planted to a hill and placed 6 inches apart in the hill. Planting too thickly should be avoided, as this lessens the fruiting capacity of the tree considerably. The season for sowing will vary according to the locality—September or October will probably prove suitable for most parts.

The seed germinates rapidly. When six to ten inches high all but the strongest and most vigorous seedlings should be removed, and the ground weeded and cultivated, as for tobacco or mealies.

In warm climates, the plants may grow too rapidly, and a large wood growth formed to the detriment of the seed production. To avoid this the main stem of the plant should be pinched back to increase the bearing surface.

The plants should begin to bear in four months, and will continue to do so for two months. Thus six months is required from the sowing of the seed to the preparation of the harvest. The perennial varieties will grow and continue to bear fruit for eight years or more under favourable conditions. Where frost is prevalent, the crop can only be treated as perennial.

Harvesting.

As soon as the capsules begin to turn brown the spikes should be cut; if left longer a large proportion of the seed is shed, resulting in a heavy loss to the producer. As the spikes do not all ripen at the same time they must be cut by hand as the seed comes to maturity; they are then taken to the drying-shed and placed in layers, not more than 6 inches thick, to

dry and shell. An open threshing-floor of hard, clean swept ground will answer the purpose, provided it is suitably enclosed or a space of about 12 feet all round the heap of fruit is kept vacant, as the seed is apt in drying to spring out and be lost unless this precaution be taken.

The heaps must be turned over once or twice a day until all the capsules have burst, which should be in three or four days, according to the weather. The capsules must be kept covered from the rain. When the capsules have all burst the seeds are cleaned by winnowing. The seed weighs about 46 lb. per bushel.

Yield per Acre.

The yield per acre varies considerably according to the methods of cultivation, the varieties grown, difference in soil and climate. In Texas and Florida an average yield of 58½ bushels (2,700 lb.) per acre is obtained, while throughout the United States the yield varies from 15 to 35 bushels per acre or 700 to 1,600 lb. In the Transvaal it is estimated that each tree bears 5 lb., and that 2,000 tress go to the morgen. In India the yield of a castor crop grown mixed with cereals, as is the custom in some parts, is about 500 lb. of beans per acre.

Percentage of Oil to Seed.

The percentage of oil obtained from seed is variable, as the following table shows: —

Transvaal, percentage of oil from whole seed, 49.93 per cent.
Transvaal, decorticated (shelled seed), 66.17 per cent.
Texas, 46.95 per cent.
France (South), 47.78 per cent.
France (North), 45.35 per cent.
United States of America, 32.8 to 40.1 per cent.
India (Calcutta and Madras), 38.4 to 34.27 per cent.

The American standard is 4½ gallons of oil from 112 lb. of seed, but in some cases it is considerably below that figure. The mill yield ranges from 33 to 40 per cent., though the actual oil content of the seed runs from 50 to 60 per cent. by analysis. The difference is due to wastage, and it is always as well to bear this fact in mind when making calculations on the basis of any analyses.

There are not many figures obtainable respecting the oil content of the various varieties, but the Transvaal castor beans compare very favourably as to oil content with those grown elsewhere. The following are analyses of three varieties grown in the Transvaal.

1. *Ricinus minor*, very small seeded variety.
2. *Ricinus Zanzibariensis Veridis*, very large seeded variety.
3. *Ricinus communis levidus*, medium sized seeds.

	1.	2.	3.
Average weight of seed, in grammes	0.257	0.867	0.581
Average number of seeds per lb. ...	1,760	523	766
Percentage of husk	23.6	19.9	25.9
Percentage of kernel	76.4	80.1	74.1
Percentage of oil in whole seed ...	47.8	52.1	52.3

The Extraction of Oil.

On obtaining the seed from the grower, the beans are first passed through suitable decorticating machinery, which consists essentially of two revolving rollers set so as to crack the hull or seed-coat only, which is

then removed by winnowing. From this it will be seen that a great saving of time and labour is caused by growing seed of a uniform size to avoid hand sorting, which will otherwise be unavoidable, as the seed must be fairly uniform to pass between the rollers.

This operation of removing the husk necessitates considerable care because if the beans are crushed too hard the pulp becomes macerated, and passes out with the husks in the winnowing. Again, if insufficiently crushed it entails auxiliary labour in picking out the seeds which are whole, and passing them through a similar process for a second time.

There are four recognised methods employed for the extraction of the various grades of oil. The removal of the husks is necessary in each process.

Method No. 1. Cold Pressure.—This is the most expensive process. A considerable outlay on machinery is necessary. The resulting oil is used for medicinal purposes. After the removal of the husks, as described, the beans are crushed to facilitate the flow of oil when subjected to pressure. The mash is placed in small bags 14 inches square and piled up with a hot iron plate between each and subjected to pressure. The pressing room is kept very warm, and thus the sluggish oil slowly oozes out into the receiver. It is stored for a few days to fine, then filtered through linen into drums or bottles.

No. 2. Crude Extraction.—After the removal of the husks the kernels are placed in hempen cloths and pressed with screw or hydraulic presses. The oil is then boiled to separate the albumen and mucilage. The impurities are skimmed off and the oil syphoned and run off carefully to prevent re-admixture of albumen; it is then strained through flannel, and is ready for use.

No. 3. Decoction.—The seeds are treated as above, but are first bruised, boiled in water, and gently roasted, to facilitate easy expression; the oil is re-boiled to dissipate the acrid principle. It is said that this method produces a brownish oil, with a sour taste and irritating properties.

No. 4. By Solvents.—In France and Italy a method of extraction by the aid of alcohol is sometimes used. This oil is said to be less disagreeable to the taste and more effective than the ordinary oil.

Diseases and Drawbacks to Crop.

It is an exhaustive crop to the soil. The most common pest is caterpillar, which does much harm in unfavourable years. The remedy practised by some cultivators is smoking the plants with torches. Another pest that attacks certain varieties especially badly is a green fly (*Empoasca Flavincens*, Fabr.)), which punctures the leaves and causes them to shrivel and drop. When six months old the plants have been completely defoliated, and cease to bear any crop. But, after all, no crop is without its plagues, and these must be regarded as part of the unavoidable risks connected with any venture.

General Remarks.

The average number of seeds in 1 lb. vary according to the variety. Hence the quantity of seed sown per acre will vary correspondingly.

Ricinus minor	1,760 seeds per pound.
Ricinus Zanzibariensis Viridis	523 ,, ,, ,,
Ricinus communis Lividus	766 ,, ,, ,,

The question of growing sufficient castor oil for our own use has often been raised, and perhaps it will be as well to give a few facts here. The chief use is as a lubricant, especially for the railways.

The Alpha Co-operative Oil Factory of Pretoria has been working for a considerable time, and now offers to buy castor oil seed at 15s. per 200 lbs. at the Factory.

The General Manager of the Central South African Railways states in the "Transvaal Agricultural Journal" for January, 1906, that the estimated annual consumption of castor oil on the lines under that administration is about 66,000 gallons per annum. To produce this necessary amount of 66,000 gallons it is estimated that 1,900,000 lbs. of seed would be required, yielding about 35 per cent. of oil, and assuming an average yield of 1,000 lbs. per acre, it would require 1,900 acres under crop to produce this quantity. A Transvaal soap factory is also likely to take a certain amount of seed if a surplus were produced, and inquiries have also been made in the same direction from Durban.

Last year 124,000 gallons of castor oil were purchased for the service of the Cape Government Railway Department at a cost of £15,629 3s. 4d., all of which had to be imported. There is thus in Cape Colony alone a large market, and on the same basis some 4,000 acres could be advantageously put down to this crop. The sale of small bottles of castor oil for lubricating Cape carts is a retail business of no small magnitude in the aggregate, and would considerably augment the above figure, while there is a constant demand at a higher price for the refined article for medicinal purposes.

In India it was a regular practice to issue a basket or two of seed to gangers to sow at their leisure, and the men gathered the fruit when ripe and sold it to the Administration at a few pence a bag. But the East Indian Railway Company now purchase by annual contract the required amount of seed from producers on condition that the seed will yield 37 per cent. of pure castor oil. The oil unrefined is considered the best lubricant that can be got, being thick or viscous, and it has the great merit of being most unpalatable.

THE LOCUST PLAGUE.

(By C. P. Lounsbury, B.Sc., Government Entomologist.)

The Government Entomologist in his Annual Report for 1906 offers the following interesting remarks on the Locust Plague:—

Matters in connection with locusts occupied considerable thought and time on the part of the Entomological Branch during the year, although little attention was given to actual field work. The importance of the subject leads me to devote more space to it than to other matters. Two distinct species of plague locusts ravage the Cape Colony, the Red-winged Locust and the Brown Locust.

The Red-winged Locust (*Cyrtocantharis septemfasiata*, but better known as *Acridium purpuriferum*) is the larger of the two, but the one of less importance. It is *the* plague locust of Natal, the eastern low veld of the Transvaal, and of a strip of coast in the east of the Cape Colony. Its present visit into Cape territory began in 1893, and two years later its vast winged swarms covered most of the country to the coast east to south-east of Griqualand West, and south of the coastal range of mountains swarms migrated early in 1896 westward to Swellendam. Since 1896 it has been confined to the eastern seaboard. Few swarms were reported in 1906 either in the Colony proper or the Transkei, and fewer still of late months, and it is not improbable that the long invasion is practically finished. However, it is not yet safe to speak with any degree of confidence, for there is far greater trouble from the species in Natal in this 1906-1907 season, than there was in the 1905-6 season, and the present condition of the Cape may be a short lull before another storm. The Red-winged Locust should not be confused with the large, clumsy, heavy-bodied, gaudy-coloured Locust (*Phymateus sp*), which often occurs in tiny swarms in the Western Province; but when the south-western districts do get large migratory swarms of locusts they are probably always of the true Red-winged species. At long intervals the Cape Peninsula and the adjoining districts have been ravaged, and many an up-country farmer fervently hopes that this fortunate section of the Colony may soon suffer again, not from any illwill towards the vine and fruit farmers, but in order that the Government in Cape Town may be brought to realise the gravity of the locust problem inland. The last invasion of the Cape and surrounding districts occurred in 1843, on which occasion vast swarms perished in the sea and were returned by the waves, with the result of impressing townspeople as effectively in death as they had the country people in life, though in quite a different manner. Previous invasions are recorded in 1653, 1687, 1695, and 1747. The 1747 invasion was particularly severe, the garden crops and pasturage of the then very small Colony being destroyed. Many cattle and sheep died of starvation in consequence, and meat doubled in price. These facts are mentioned to stimulate interest in the locust problem on the part of Western Province legislators, who, because they have never been directly affected by the pest, seem not to regard it seriously.

THE BROWN LOCUST.

The Brown Locust (*Pachytylus sulcicollis*) is the chief migratory locust at present. It is pre-eminently an inland species, swarms rarely reaching the eastern seaboard and perhaps never the southern and south-western. The present invasion began in 1890, and reached its height in Cape Colony in 1892 and 1893. Invasions of this species have been of much greater frequency than invasions by the Red-winged, and the idea has prevailed since 1893 that the pest would shortly disappear, as it is credited to have done after a few years of abundance in times past. This hope of an early abatement of the plague without organised assistance on the part of man has doubtless been a patent factor in the neglect of the Government to wage a vigorous campaign against it. Yet sixteen years have passed since the first swarms came out of the arid north-west, and though the numbers of the pest have fluctuated very considerably, and in a few seasons have been relatively insignificant, there is still no sign that the invasion is approaching a termination. In the hope of obtaining data that would throw light on the duration of locust visitations in the past one of the staff this year spent much time in seaching out references in old records, books of travel, and other likely sources of information. The knowledge gained is disappointingly meagre, but sufficient to my mind to show that the pest comes so often and stays so long, and is of such importance that the Government should determine, as far as possible, what measures to mitigate the plague are profitable and warranted by circumstances, and should keep *in continuous readiness* to bring those measures into action. The first inland locust invasion to which we have found definite reference began in 1797, about eleven years after the site for Graaff-Reinet, the first Karoo town, was decided upon, and lasted until about 1808. In 1824 the country as far south as Bedford was again overrun, and remained so until about 1831. The period 1843 to 1854 seems to mark the next invasion. Then with the break-up of the memorable 1862 drought the pest appeared and remained until 1876. From 1876 to 1890 the eastern part of the country seems to have been quite free, but some swarms are said to have appeared in the drier north-central portion of the Colony in this interval. It is quite safe to say that the Kalihari Desert and the country round about it is the centre from which the more habitual parts of South Africa derive the initial swarms of an invasion, and the pest spreads east, west, and south, and apparently northwards as well. Somewhere or another in that vast region it is probable that the insect is present every year, and it is not at all unlikely that it is also a permanent inhabitant of extensive tracts of country south of the Orange River, as in Bushmanland and portions of Griqualand West. The circumstances which give rise to the enormous swarms which at intervals migrate from these parts are still shrouded in doubt, which future observations, extending over an indefinite series of years, alone can dispel. However, the writer conjectures from his meagre knowledge that a period of excessive abundance of this species of locusts is terminated chiefly by the agency of locust birds and fly parasites, and that therewith the pest disappears from notice. In the parts of the country where the conditions favourable for life are most uniform from season to season enough of the enemies may permanently remain to prevent excessive multiplication, perhaps over large areas, as, for instance, the midland and eastern districts of the Cape, to bring about total extermination. Meanwhile that in regions like Bushmanland and the Kalihari, where longer droughts prevail, the enemies are more or less completely lost through the entire absence of any food for them, while the pest is preserved in the egg stage, and thereafter left to be controlled principally

by the limitation of its food. Then that by the occurrence of an exceptionally favourable season, when there is an abundance of eggs in the ground, immense swarms are matured, which tend to migrate on the wind to distant parts. Naturally the bird and insect enemies, being scarce, are unable to cope with great swarms for a few seasons, and during this time the pest continues to multiply and spread, it now having unlimited good country before it. If no fresh swarms arrived the better country would, it is conjectured, become cleared of the pest by its increasing enemies soon after the climax of the invasion was reached; but reinforcements to a greatly varying extent appear to come from the desert parts for successive seasons. It is more difficult to suggest an explanation for the incoming swarms that thus prolong an invasion, but it is possible that they are in reality swarms which were hatched in the better country and which migrated desertwards soon after acquiring wings, with the result of temporarily throwing off their enemies to a large extent, or else that they are the immediate descendants of such swarms. Although it has not been demonstrated that very extensive migration of newly-winged swarms towards the desert occurs from the country south of the Orange River, such a movement appears to be the rule in the Transvaal, according to the late Transvaal Entomologist; and altogether there is much ground for suspecting that the occupation of the invaded territory is kept up, directly or indirectly, entirely by the swarms which mature therein.

The Question of Destruction.

It is now established that in South Africa locusts can be fought most economically when they are in the voetganger (hopper) stage; and persons who have had experience with the measures now advocated are probably all agreed that the destruction of voetgangers *that threaten crops* is generally very profitable. Statistics collected by the Natal Entomologist on the result of the 1906 locust campaign in that Colony show that the crops, which otherwise would in all probability have been devoured by the pest, were valued at more than ten times the expenditure. Unless there is certain to be ample food for both pest and stock, it is also probably very profitable in most districts to destroy voetgangers *that threaten the pasturage* only. But whether or not it is economical to destroy locusts in one district because of the damage which they or their descendants might do in other districts is at present very problematical. If thereby an extensive invasion might be averted, it certainly might pay to incur an enormous expenditure in destruction measures even in sparsely-settled, non-agricultural country, where locusts are regarded as much a blessing as an evil; but if all that is practicable will not materially lessen the extent of an invasion of better parts, it seems absurd to undertake destruction in parts of the country where it is not clearly profitable on local considerations.

The Need of Information.

From the foregoing paragraphs I hope it is evident that a very urgent need in South Africa is more complete information on every phase of the locust problem. It is important to ascertain the areas in which the pest may survive during the years when it appears to be absent from settled parts; to learn definitely what conditions account for the periods of excessive abundance; to what extent invasions are kept up by swarms originating in inaccessible territory, and whether or not many swarms from districts where extermination is practicable return to desert parts to breed. Clearly

such questions can be satisfactorily answered only through observations made throughout the whole of South Africa, subject to visitation. In the portions where active measures against the pest are undertaken, there is still more direct application for data on the occurrence and distribution of swarms, inasmuch as such information is necessary to enable the Government concerned to be prepared with supplies. For this more direct object Natal has had a system of reporting in operation for ten to twelve years in connection with its Locust Destruction Act. The Transvaal began two years ago, adopting as its method the broadcasting of many thousands of postcard forms, on which the police, farmers, and others were requested to note the passage of swarms and other information. The Cape has not organised any comprehensive system of locust destruction under Government supervision, but off and on for the past dozen years has collected information from field-cornets and others; and early last year my Branch began a methodical and almost complete system, which it is hoped will be continued indefinitely. The system is a dual one, consisting of immediate card reports by private parties and monthly statements by the police. With the assistance of the local Magistrates in selecting them, one or more parties in every field-cornetcy throughout the portion of the Colony subject to visitation was appealed to to furnish us with a postcard report (1) whenever swarms arrive or pass; (2) when eggs are laid; (3) when eggs hatch; (4) when young locusts get wings; and (5) when new swarms leave the vicinity. Two hundred and eighty-one voluntary reporters have thus been secured. Each of these is kept supplied with a few postcard forms, and sent, at least, an occasional circular acknowledgment, with thanks for his assistance. The place from which he reports is marked on a wall map, and the information received from him is shown on small labels pinned to the spot. By using different coloured labels the information for several successive months is kept distinct. The receipt of every card is recorded in a book against the sender's name, both to enable us to know when to send more cards and to show us at a glance if interest appears to have been lost. The map shows roughly the condition of the country as regards locusts for a series of months, almost up to date, as the approximate size of swarms, whether winged or voetganger, the direction of movement, the time of pairing and egg laying, and the presence of locust birds, are all indicated. A small map for permanent record is compiled from the large one each month.

The police reports were arranged for through the kind indulgence of the Commissioner, Lieut.-Colonel M. B. Robinson. They consist of a monthly return rendered by each of the 318 Cape Mounted Police patrol stations located in the area subject to visitation. A return shows the number of farms in the area and the number and situation of those on which locusts in any of the several stages were observed, or were reported, in response to inquiry, during the previous month; and calls for a brief statement on the conditions as compared with the previous month or the previous season, and on the passage of unusually large swarms over the area. Small maps have been printed on which the location of each station is indicated by a number, and on one of these maps the distribution and abundance of locust eggs, voetgangers, and winged locusts, as indicated by the police returns, is shown for every month. As the information given may be a month old when a return is made, and as nearly another month may elapse before all returns are received, it follows that the returns may not be of much use for forecasting purposes and for placing supplies, which purposes the immediate card reports may fulfil, but they furnish a reliable record to show the extent and intensity of the visitation month by month, from which in time valuable deductions may be made on the problematical matters alluded to above.

INTER-COLONIAL LOCUST BUREAU.

It is above stated that to get full light on locust questions it is necessary to obtain information for a series of years from all the countries in the sub-continent that are visited by the pest. Early in the past year Mr. C. B. Simpson, the late Transvaal Government Entomologist (recently deceased), suggested the establishment of a central office for the collection and study of data from all such parts, British and foreign. The officer in charge, he pointed out, could furnish reports at frequent intervals, and immediate emergency ones, when circumstances warranted it, to all of the Governments concerned, and thus enable them to prepare for oncoming swarms, of the existence of which they might otherwise be ignorant; and in the course of time data would be on hand from which comprehensive deductions on the broad questions alluded to might be drawn. Lord Selborne, the High Commissioner, warmly approved of the plan, and arranged for the consideration of this and other locust matters by representatives of the Transvaal, Cape Colony, Orange River Colony, Natal, and Basutoland. The conference was held at Pretoria in August last, and was attended by the writer on behalf of the Cape. As a result of the resolutions then adopted the "Inter-Colonial Locust Bureau" was formed, and is about to begin work at Pretoria. It is to be supported by contributions from the several British Colonies, and its work is to be under the supervision of a Board, composed of one representative from each of the contributing Colonies. The cost for the first year is estimated at £500, of which the Cape has paid as its share £150. The proceedings and resolutions of the conference at Pretoria have been published on the suggestion of the High Commissioner. The centralisation scheme will not necessitate any change in the systems of collecting data now in operation in the Cape Colony; the card forms and police returns will be received and recorded at my office as they are now, and depatched with the least possible delay to the Bureau. It is probable, however, that arrangements will be made to have telegraphic advice of the passage of very large swarms moving eastwards over Bechuanaland and Griqualand West sent direct to Pretoria from a number of centres in the sections named.

SUDDEN APPEARANCE OF IMMENSE SWARMS.

In a paragraph above the suggestion is made that the sudden appearance of immense swarms in desert parts may perhaps be accounted for "by the occurrence of an exceptionally favourable season when there is an abundance of eggs in the ground." The assumption that an abundance of eggs may sometimes be in the ground in seasons when the parent insects have not been correspondingly numerous is based upon the fact that eggs of the Brown Locust may retain their vitality for years, and that they will hatch only when they are exposed to suitable temperature conditions, accompanied by abundant moisture. At irregular intervals, some travellers say about once in ten years, the dry parts alluded to receive very widespread, soaking, summer rains. Between these exceptional seasons most of the rainfall is said to be in more or less local showers. I must acknowledge that I have been able to get little positive information either for or against the idea, but I think it probable that much ground, which in the exceptional years is clothed in grass, in the years between escapes rain sufficient to hatch locust eggs, which it contains for a succession of seasons, though in almost, if not every, year throughout the area there are parts which, through being amongst those so fortunate as to catch good showers, have the pest. Under such conditions one can imagine that when a long drought

is broken the soil in patches over tens of thousands of miles of territory is stocked with eggs, some laid only a few months before, others one, two, or three years, and some perhaps far longer. In support of the suggestion may be mentioned the facts that the evaporation of moisture from the surface is extremely great in the parts of South Africa referred to, that the showers are generally violent and of short duration, causing much of the water to flow over the surface to lower levels instead of soaking in where it falls, and that rains in cold weather are not likely to affect the eggs. That eggs may hatch after being in the ground for a number of years is a common belief in parts of the Colony, and although most of the statements which one is told in support of the belief are doubtless unreliable, a few appear to be thoroughly trustworthy. Nevertheless, the writer would be somewhat sceptical were it not that he has secured experimental verification. Eggs in large quantity which were secured in August, 1904, have retained their vitality. The bulk has been kept dry in tins and jars, and at intervals of a few months successive small lots have been transferred to dishes, wetted, and placed in an incubator heated to about 90° F. In every instance hatching has commenced in about ten days. Large numbers are hatching now, February 9th, 1907; and it is worth noting that they are from a lot of eggs that is stored without surplus soil in a deep jar. At first the jar was closely covered, and after some months it was noticed that moulds were growing, and that a rank odour pervaded the contents; in consequence the jar has since been left open to the air. During the summer experimental lots when wetted have hatched without artificial heat, but one lot wetter during winter and kept at the room temperature did not develop. One incubated lot, which after an abundant hatching was allowed to become quite dry, was again wetted, and kept warm, with the result of bringing out a few young which had not developed on the first occasion. This was in agreement with the common observation of many intelligent farmers that several hatchings from one laying of eggs may take place, each following after a rain; in such cases it is assumed that the soil fails to receive and retain sufficient moisture from the first rains to penetrate the whole egg-pod. Under normal conditions in the districts from which they were received, the eggs used in the abovementioned experiments would have hatched in September or October, 1904. This explanation for the sudden development of the pest in a magnitude which gives rise to the migration of mighty swarms would be greatly strengthened if it were shown that invasions from the north-west into the Orange River Colony and the Cape districts to the southward coincided with the break-up of extensive droughts in the far north-west. Unfortunately, little meteorological information in regard to the area concerned is available. But Moffat in his "Missionary Labours" states after being absent twenty years the pest appeared at Kuruman in the good season of 1826, after several years of severe drought in those parts, the great invasion of the Colony in 1863 and 1864 followed dry years, terminating in the terrible drought of 1862, and the last invasion came with the splendid seasons 1889 to 1891, when, after a succession of poor years, the far north-western districts shared in the widespread, soaking summer rains. Good years in the arid parts, however, do not necessarily harbinger an abundance of locusts, for through the agency of natural enemies or other causes in previous seasons the pest may at the time chance to be relatively scarce.

The Conditions in the Cape Colony.

as regards the species of locust under discussion appear to have been no worse last year than in the year before. The area south of the Orange River received little of the pest from the parts to the north and west, and

the districts which suffered most were those lying north of the Sneeuwbergen and Winterbergen and between the Transkei and the middle line of the Colony, the locusts, apparently, being the progeny of those which bred in the same area the year before. I am unable to present any statistics to show the extent of the damage done. In general the veld recovered quickly, owing to the abundant rains, but a great number of farmers lost a large part of their crops. The Orange River Colony and the Transvaal were more unfortunate than the Cape. During March many immense swarms entered Eastern Bechuanaland and Griqualand West from the desert, and, together with great swarms bred in the parts named, migrated south-easterly, easterly, and north-easterly into the neighbouring Colonies. It took them about a fortnight to pass from Kuruman and from the Langeberg to the border. These swarms devastated the winter veld over large areas, and deposited eggs far and wide. When the spring rains came voetgangers appeared in what is said to have been an abundance unprecedented since the settlement of the country, and it is said that over whole districts hardly a square mile of surface escaped the pest.

A vigorous campaign against the insect was waged in both Colonies, but great numbers, it is thought about as many as were killed, reached maturity. At the time of writing small swarms are numerous in the Cape Colony, and many are already laying their eggs. Were it not that locust birds, both large and small, are rapidly on the increase, and are exceedingly numerous already in many districts, one might safely predict that the pest will be as bad during 1907 as in any year since 1893. During the past month, January, however, very extensive hatching is reported to have followed exceptionally good rains in Gordonia, Kenhardt, and Carnarvon, and there is danger that the swarms developed in these parts may migrate east and south-east and inundate the country to an extent far beyond the capabilities of the birds to materially effect destruction during the first season—in other words, that we will have a return of the conditions which ruled in 1893. I reiterate that the Government should give its most serious attention without delay to the problem of mitigating the ravages of the pest. With the hope of stimulating action, a lengthy memorandum on the subject, in which a definite scheme of organisation was suggested, was submitted by me in January, 1906. But on the ground that most rigorous economy was necessary, the estimate of £7,500 which I recommended was cut down to £500, an amount too small to warrant the appointment of any special officers. A vote of £10,000 will be recommended by me this year, and no doubt this much can be expended to the great advantage of the country, even if the pest proves less abundant than last year. If the money is not voted, the uncreditable anomaly of the Cape Colony standing by and doing practically nothing, while the smaller and younger Colonies, which for years it worried with appeals for co-operation, are doing their utmost, will continue to exist. The methods of destroying the pest developed in recent years in South Africa are far in advance of those known in the past, and if locust destruction was ever profitable in the country it certainly is now.

NOTES ON ERIOSPERMUMS OF THE HEX RIVER VALLEY, C.C.

By Mrs. K. L. Davidson.

Professor Kernir's remark "that for the building up of the science of the Biology of Plants everything relating to the subject has its value and is capable of being turned to account . . . be it only the discoveries of an amateur regarding the flora of a sequestered valley" is so apposite that it encourages me, as an amateur, to draw the attention of botanical people in South Africa to a singular and interesting genus of Liliaceæ—Eriospermum—which occurs in considerable variety, though very locally, in the Hex River Valley. Two facts suggest that further study in this direction may be of use: first, that four species only are mentioned in Mr. Bolus's invaluable "List of Flowering Plants" as occurring within the limits of the Cape Peninsula—three of them being characterised as rare. Secondly, that of the eight (or more) species indigenous to the Hex River district, several are unrepresented in the Government Herbarium, and could not be identified. It is, therefore, possible that a good deal remains to be learned about Eriospermums, and, at least, no harm can be done by bringing them into further notice. Since my return to England, moreover, communications from Kew and Edinburgh on the subject tend to confirm the surmise that the knowledge even of botanists with regard to the genus is still somewhat limited, in spite of some 20 or more species having been described under Liliaceæ in the "Flora Capensis."

The general characteristics of Eriospermums are as follows:—

1. The fleshy tuber, often large, which is usually buried some inches below the surface of the sand, and of which the substance differs in certain species.

2. The flower scape, which, in respective species, varies from 3-4 inches to 18 inches, and in some cases appears many weeks before the leaf—a habit, by the way, constituting a very serious obstacle to the making of accurate observations.

3. The cotton-like hairs enveloping the testa of the seeds—unusual amongst the Liliaceœ.

4. The solitary leaf—the peculiar formation of which, in one section at least, gives to Eriospermums the special interest attaching to the genus.

The second and fourth of these characters are not strictly constant, as some species occur in which the flower scape is co-incident with the leaf; in others, three or more leaves are produced; while the solitary leaf in many species is quite normal. In a certain few, however, the leaf proper, so to speak, is reduced to very small proportions, but is supplemented by curious appendages or processes growing out of the minute cornucopia-like blade, which is generally either pilose or tomentose. Three species of the latter class—all very distinct and by no means general to all parts of the valley—rewarded a somewhat patient and diligent search.

The first of these was found on August 6, 1905 (see photograph No. 1, with dried specimen), and I am indebted to Dr. Marloth for the clue he gave me, from the insufficient material at hand, as to its identity. This species—so far as is at present known—grows in a very limited area in the Hex River Valley, but within which it is tolerably abundant. It occurred in full leaf on July 7, 1906, fully a month earlier than in the previous years, but no trace of flower scape, even in a withered condition or in seed was ever met with. The flat process, 3-4 inches in length, covered with soft linear appendages, imbedded in cottony hairs, grows out of a whitish tomentose sheath which is, presumably, the leaf proper. I believe that Dr. Marloth considers this species to be near, if not identical with, *E. paradoxum* (Baker). The tuber is large, with many root-fibres, and with red flesh of loose granulated, almost crystallised, texture.

On April 18, 1906, flowers of an Eriospermum were gathered and a few bulbs secured and planted which, early in June, had each produced a single leaf—a minute, purplish, heart-shaped, pilose cup—out of which grew ten or more linear processes, as shown in the photograph (No. 2). Being able thus to match flower scape, tuber, and leaf, it was possible to trace this species back to its own locality, which, as its whereabouts had entirely escaped memory, required a good deal of search. It is suspected that this species will prove to be the rarest as well as the smallest of the genus.

The third species of this section found in the valley (see photograph No. 3), with leaf appendages, is more robust than the last, but still small in all its parts. It may possibly prove to be *E. alcicorne*, and is the most frequent of the three, though likely to be overlooked from a superficial resemblance to seedlings of certain of the veld-bushes amongst which it grows. It is quite possible that flowers of an Eriospermum gathered late in March may have belonged to this species, as specimens of it were afterwards found on or near the spot where the flower spikes were collected, but as tubers could not be secured at the time of flowering, the point had to remain undecided.

Of the commoner species—none of them, however, very abundant in their several habitats—two have acuminate leaves more or less obviate, somewhat resembling those of tulips. These are distinct one from the other, however, though similar in character, and appear to flower more freely than some of the other groups. The flower scapes in each are from 12-18 inches in height—the flowers of the one being pedicellate and of the other sessile. The type of flower is well represented in a plate of the "Botanical Magazine," to be presently referred to. In both of these species, seeds are produced in abundance, and are freely distributed by means of the fluffy cotton with which they are surrounded. I had almost arrived at the conclusion that these two species produced no leaf in the season during which they flowered, but a further search and examination proved that the flowering tubers were merely much more tardy in the leaf development than those which did not flower. Probably, as with many other South African bulbs and tubers, the flowering is intermittent.

In a third species of this type, but much less frequent, the leaf is long and lanceolate, and of this no flowers have been found.

Two more species remain to be noted, both of them very distinct from all the others above-mentioned, and with cordate leaves. Photograph No. 4 represents, probably, *E. pubescens*—the thick, silky "fur" at the back of the leaf being shown in the right-hand specimen. This species is very abundant on the veld between Hex River Station and Orchard Siding. Another species (photograph No. 5), possibly *E. latifolium*, is found growing freely in its company.


3.
2.
4.
1.
5.

In the "Botanical Magazine" (t. 1,382), *E. latifolium* is represented with a flower scape practically identical with that of the tulip-leaved species mentioned above; whereas, on reference to the dried speciments which accompany photograph No. 5, it will be seen that in the Hex River species, the peduncle is short, and in the living state is thick and somewhat succulent and curving downwards with crowded pedicals. It may be that some confusion had taken place owing to the difficulty of being sure of allotting the flowers to the tubers to which they rightly belong. It may be noted, on reference to the plate in "Botanical Magazine," that the flower scape is given separately from the plant. The shining, bright green leaf of this last species, often 3-4 inches across, is very conspicuous as it lies flat on the sand, especially as the plant is of the sociable cast. Scores of plants were examined for traces of flowers, with poor success, for I unfortunately missed the exact flowering season, but some half-dozen were found, one of which still retained seeds in some of the capsules. The rest had been shed on the sand about the plant and were beginning to germinate. As many as possible of these germinating seeds were gathered up, and sown, and these continued their growth successfully until, with regret, I had to leave them. The tubers in this species are large and white-fleshed, with a solid close texture like that of a potato.

There is reason to believe that still another small species is to be found on Sugar Bush Kopje, where, on May 12, 1906, I found numerous withered flower scapes in seed, but no time remained for further investigation.

Should these few notes lead to a thorough search into the characters of this curious, if not specially ornamental genus, I shall feel that a good deal of work has not been quite wasted. As far as could be ascertained, the coloured folk make no use of the tubers of Eriospermums, as they do of so many of the veld plants, but the verdict of "no good," given by an intelligent old Cape "boy," with a serious shake of the head, might be interpreted in more ways than one. Two questions occur—to be answered by more enlightened students: —

1. Do Eriospermums possess, especially in the tubers, any essential properties, medicinal or otherwise, rendering them either of use or injurious to man or animal?

2. As no part of a plant is useless, what is the significance of the peculiar leaf formation observed in a limited section of the genus?

It may be added that a few days before sailing for England at the end of September, I found, not far from Ceres Road Station, on the veld towards the Government timber plantations, a species of Eriospermum with three or more leaves of a somewhat shaggy nature, which may indicate a locality in which search might be rewarded.

THE FINANCE OF FARMING.

By P. J. Hannon, Superintendent of Agricultural Co-operation.

The following paper was read by Mr. P. J. Hannon, Superintendent of Agricultural Co-operation, before the Institute of Bankers, Cape Town, on Thursday, July 18: —

The preponderating influence of the agricultural industry in the economic life of this country is so obvious that, as an introduction to the short address which I have the privilege to deliver this evening, it will be unnecessary to do more than emphasise the fact. The success of Cape farming is, however, surrounded by a great number of complex problems to the solution of which all that is best in the thought of the Colony is being given at the present moment with more intensified energy and more clearly conceived purpose than has probably been the case heretofore in our history. The proceedings of the recent Congresses of the Central Farmers' Association, the Agricultural Union, and the Associated Fruit Growers' Associations need only be referred to as convincing testimony of the really "live" condition of rural thought and the far-reaching activity of present day organisation These associations, composed of earnest enthusiastic agriculturists, exhibit in no uncertain way those indications of the appreciation of scientific knowledge and business intelligence which underlie every branch of enterprise concerned with the land.

I am not concerned this evening with any other feature of the new manifestations of our agricultural life than the especially and all-important inter-dependence which must always subsist between agricultural production and the investment of capital. It is a fundamental axiom of all economists that the primary agencies involved in production are land, labour and capital It has, however, come to be recognised that a further influence has in the most significant way associated itself with enlarged and more profitable production, and that is the variety of activities embraced in the word "Organisation" This term in its fullest sense embodies questions affecting the other economic considerations, but more especially in its subsequent results, the provision and employment of capital.

It is quite common and indeed quite natural that the striking expansion of the agricultural industry throughout the world should be constantly referred to in dealing with development schemes in this country, and in no other respect can examples from modern agricultural progress be so effectively quoted as in the conception and maintenance of specially designed facilities for the capitalisation of the farmer. The intensified rural activities of European countries which in the course of a few generations have conferred upon comparatively poverty-stricken communities the blessings of comparative wealth, have been in large measure contingent upon statesmanlike schemes of farming finance. Little need be said here on the overwhelming position occupied in the agricultural world by the almost infinite number and variety of Agricultural Credit Institutions throughout the continent of Europe. The facts are widely known. Nor is it indeed necessary to refer to the growth of Canadian agricultural export from four millions of pounds sterling per annum to twenty-four millions of pounds sterling per annum in the course of the last 15 years.

The fact stands as a monument in economic evolution. The rapid strides made in all branches of agriculture in the Australasian Colonies are familiar; and analysis of the causes to which this remarkable achievement may be attributed reveals as its most striking component factor the provision of capital under favourable conditions, and its judicious application by the people on the land

In dealing with the subject of farming finance, so far as it is possible in the limits of a paper of this character, it may be convenient to consider the question under two heads: Firstly, and this shall necessarily be rather by way of suggestion in the discussion of existing facts, I shall offer some observations on the use of capital by the farmer; and secondly, I shall submit, with all deference, certain views on the means of providing capital for productive agriculture, where under current circumstances it may be lacking.

The Use of Capital by the Farmer.

On the subject of the first of these questions I am bound to say here that there is very considerable difficulty in this country in determining with any fair degree of accuracy what is called cost of production in farming The keeping of farm accounts is "more honoured in the breach than in the observance," and in the vast majority of cases one is much disconcerted by the vague notions which prevail on the amounts of the fixed and circulating capital concerned with the maintenance of an ordinary farm

I tried to procure from a large number of gentlemen engaged in diverse branches of Cape agriculture and pastoral pursuits, estimates of the actual investments made in view of anticipated returns, but only in very few cases have I obtained satisfactory results It is essential in my opinion that in devising schemes of agricultural organisation, and particularly in all questions involving the application of capital to productive industry, accurate data should be forthcoming with reference to every item involved in the raising of crops and the feeding of farm animals, and of course among other up-to-date agricultural communities one finds the farm balance-sheet a familiar and indispensable part of farm management. One must not, however, find fault with the farmer on this account, and in anything that is said here dealing with the application of capital, there is always in view the peculiar circumstances affecting the history of Cape farming and the abnormal difficulties and contingencies with which in the past this industry has always been face to face At the same time it seems to me a beginning must be made in the direction of a clearer understanding of the true economic principles which underlie agriculture as a business undertaking. In all manufacturing processes and in all well-organised commercial undertakings, every branch of enterprise is carefully departmentalised, and the capital invested not merely in the undertaking as a whole, but in its respective sub-divisions is an essential consideration, having regard to its localised productive power. It may be said that in farming the application of account-keeping in this respect is impossible, but what has been wrought out elsewhere cannot present insuperable difficulties here, and what has been distinctly advantageous in other parts of the world, cannot certainly be said to be less desirable.

But in addition to account keeping there should be a fairly business-like understanding of the limits within which capital may be allocated for each branch of the operations with which the farmer is concerned Of course, relations between amounts invested in one way or another may constantly change, but the successful adaptation of farm management to such changes with the smallest possible loss is the real test of scientific farming.

In Great Britain and America the employment of farming capital is carefully apportioned, and with reference to the system pursued, each amount is a fairly constant percentage of the whole. Thus on an English agricultural holding, with mixed tillage and grazing, the division of capital, apart from the value of the land itself, would be fairly stated in this way:

Live Stock	65	per cent.
Implements, etc.	14	,,
Seeds of all kinds	2	,,
Manure, hay, straw (unconsumed)	8	,,
Value of manual labour and all charges	11	,,
Total	100	,,

Can farmers in this Colony apportion capital in a somewhat similar way, and can they further so adjust its application as always to ensure that it is being judiciously invested with the probability of an adequate return?

This question has now to be dealt with on the lines of exactitude in view of the proposal to provide cheap capital for agriculture under the guarantee of the public taxpayer. If the State, or some institution at the instance of the State, advances capital for schemes of agricultural improvement, it clearly becomes a first essential that such projects as are contemplated are sound in themselves, and are not out of harmony with the economic exigencies of the country. Capital invested for the increase of production must be considered with reference to markets How do market conditions and tendencies point to the employment of farm capital in the Colony to-day? I am satisfied that all indications are in favour of immensely increased reproductive investment, assuming that the employment of capital is guided by organised skill and intelligence

THE PASTORAL FARMER

Let me examine a few cases. In our wool industry, which exceeds £2,000,000 annually, it is universally admitted there are vast opportunities of improvement Flocks are not by any means perfect, suitable breeding schemes are not generally adopted, and what is commonly called "get-up" in wools cannot be said to have in any measure approached the world's competition level Even were all these drawbacks surmounted, the system of disposal is open to serious objection. Enormous quantities of wool and mohair find their way to market *via* the country storekeeper, who with the best intentions in the world is, in spite of himself, a buyer of custom rather than a buyer of wool.

But the farmer is frequently helpless; bad seasons, diseases of stock, and other unforeseen calamities have made their mark, and his charges are frequently out of proportion to his turnover; so he continues his weary routine of living from hand to mouth

The provision of capital to enable farmers so circumstanced to carry on to some extent the financial side of the farm work on the basis of cash payment rather than barter is, in my opinion, one of the crying necessities in many parts of this country to-day. In the wool industry capital is therefore required for the following purposes: (1) purchase of pure-bred stock to grade up flocks; (2) the necessary outgoings of farm management, with a view to the sale of produce upon its merits; and (3) affording facilities to associated groups of farmers to receive advances on a proportionate value of their produce in the event of its being sent to a distant market or held over for a more favourable one.

But in Cape pastoral farming the urgent need of capital is nowhere more felt than in the desirability of adequate schemes of fencing. Much

of the serious trouble concerned with the production of wool and mohair arises out of the kraaling of small stock. The most experienced farmers in the country tell me that on well-fenced farms an increase of 1 lb. of wool per fleece may be counted upon as against those which are unfenced. In the case of the angora goat the increase is regarded as equal to 1½ lbs. of mohair in the same conditions Of course, some of our best sheep-walks are thoroughly fenced against vermin, but the amount already done is but a comparatively small percentage of the whole. If, therefore, the improvement referred to be extended to the whole of the wool bearing sheep and angora goats in the country, the increased annual value of our flocks would amount to at last year's average prices over half a million sterling. And this be it remembered apart altogether from the improved condition of the animals themselves, and the greater facilities with which pastoral products may be prepared for market requirements.

In our meat industry, notwithstanding considerable enlargement of flocks and herds during the past two seasons, we were indebted to an import of nearly £600,000. Is it not clear that the investment of farm capital in the raising of better stock and in greater quantity must immensely enhance our wealth producing capacity? At the present time prime slaughter oxen are selling at say 38s. per 100 lbs. dressed weight; and slaughter sheep weighing from 48 to 50 lbs dressed weight fetch from 22s 6d to 24s 6d in Cape Town; and there is considerable difficulty in meeting the demand This being so, there is apparently no sound reason why capital applied to the improvement of quality and the earlier maturity of slaughter stock, should not present an attractive margin of profit. And in this connection it may further be considered whether the application of capital in this country may not ultimately be profitably employed in the raising of meat for export after local requirements have been fulfilled, as is at present the case in the Australasian Colonies.

The Arable Farmer

In wheat and flour we imported in 1906 to the value of over one million sterling, of which two Australian Colonies contributed more than three-fourths of the whole Not the least embarassing of our economic problems is the measure in which the cultivation of wheat in this country may be extended, and how far the farmer may be justified in putting more capital into this branch of his industry

From carefully prepared returns which I have received, I estimate that clearing land, all the processes of cultivation, manure, harvesting and threshing, the area usually sown with one bag of seed wheat may be taken in the Western Province at £10 Assuming a good season the average return is 20bags, which at recent prices roughly means a return of £15 per bag of seed In the finance of the grain farmer it is to be carefully considered how far a profit of 50 per cent. is sufficient to cover all risks involved in the peculiar circumstances of this country. Increased production of wheat means increased capital, not merely in the actual preparation of the land and growth of the crop, but in improved organisation for harvesting, storage, and marketing. I am satisfied that the fullest consideration should be given to the production of our own foodstuffs derived from cereals, but its steady development can only be maintained by the judicious application of cheap capital

Viticulture

The financial considerations involved in the continued progress of Cape viticulture will be apparent from the fact that out of the 77,000,000 vines at present being cultivated, only 19,000,000 have been reconstituted upon

American stocks In face of existing depression, and the somewhat deplorable outlook for our wine and brandy, I am confident that this industry ranks foremost as a national asset, but as the steady reconstitution of vineyards must be maintained, the capital expenditure of the wine farmer in the future must necessarily reach a huge figure.

The Water Problem.

Intimately associated with every section of our agricultural activity is the conservation and use of water. Apart from large schemes which are essentially co-operative in character, and which, generally speaking, involve Government intervention in finance and administration, a large variety of smaller projects are in almost every locality within the reach of the individual. It is widely known how far the productive value of land is immediately enhanced by the presence of water, and examples can everywhere be seen in every part of the Colony in those smiling patches which stand out in pleasant contrast with apparently barren surroundings But even these small projects mean direct outlay from which even in the most favourable circumstances return sufficient to discharge the capital must extend over considerable periods of time

The Tobacco Industry.

The tobacco industry of the Colony offers immense possibilities for intensive culture if once the methods of organisation and scientific knowledge were systematically applied In many districts of the Colony this valuable crop can be raised with great success, and the returns for investment of capital are highly satisfactory In introducing up-to-date methods in the preparation of the land, the after treatment of the crop, the selection of the leaves from the plants, and more particularly in the artificial drying, and subsequent treatment before sale to the manufacturer, capital is necessary, and farmers in order to be induced to undertake the series of complex processes involved must be in a position to rely upon financial facilities as economical and as little irksome as possible.

Barley for Malting.

The brewing industries in the Colony depend very largely for their supplies on barley and malt imported from abroad, and it is unquestionably a strange situation that with an import duty of 2s. per 100 pounds the Cape farmer is still unable to produce barley for malting purposes which can successfully compete with grain imported from long distances over sea. The growth of barley however for malting purposes involves certain expense in the preparation of land, the purchase of genuine seed free from disease, and the cultivation of fairly large areas with the object of reducing relative cost of production, and securing sufficiently large parcels for sale to influence markets as against the import.

It might be argued generally that every proposition for enlarging the output of the Colony in order to effectively influence the market conditions due to organised production abroad, means the employment of farm capital, and it may therefore be said that a clear case has been established for the creation of the means whereby such capital may be procured on the easiest terms for the farmer Obviously the employment of capital in the extension of tillage, and the better organisation of pastoral products implies increase of employment and the possible opening up of schemes of closer settlement upon the land itself. It is universally admitted that the more actively the farmer is concerned with the raising of crops and the preparation of foodstuffs and raw produce for market, the greater number of

persons must take part in his operations, and consequently assistance rendered by the State or by financial institutions in the encouragement of agriculture, means a larger field of consumption for those engaged in the distribution of manufactured articles.

Capital is Necessary.

If you will now accept the proposition that capital is necessary, and that its employment under favourable conditions tends to the general prosperity of the Colony, the question has to be considered from what sources such capital is to be derived.

On this subject it will be interesting to discuss for a moment in what circumstances the intervention of the State may be justifiable as a means of supplying cheap capital, and whether such intervention may operate injuriously against existing financial corporations.

To this problem a two-fold test may be applied, viz.: that of experience and that of necessity. Voluminous evidence may be produced indicating that under circumstances such as have to be dealt with in this Colony the State may intervene in finance with the largest possible measure of advantage to the agricultural producer, and the results have always been more than justified by the perfectly natural operation of the increased prosperity on every branch of industrial and commercial enterprise

In continental communities, and in British Colonies, the guarantee of the State in the organisation of capital for agricultural production has exercised the most far-reaching beneficent influence upon national life, and although conditions here are not always analagous, it can hardly be seriously contended that a similar system would not confer a large measure of benefit.

From what has been said, therefore, I think there can be no doubt whatever that in the peculiar circumstances of this Colony the State is perfectly justified in using its resources to provide for the great staple industry of the land the absolutely essential factor in organised production.

But the intervention of the State implies at once adequate security of the taxpayer, and therefore in the advance of public moneys for reproductive schemes the public guarantor must be as fully protected as possible. With due regard to this consideration the Australasian Colonies have safeguarded the public interest by making individual advances only upon first mortgages of real property, and as between the State and the individual farmer no modification of this arrangement can be suggested on the basis of sound economics It is, however, apparent that productive activity under the operation of this inevitable condition has its limits, and these are still further emphasised by the fact that with the best intentions in the world the State is under its first mortgage scheme assisting a class of borrowers whose position renders them capable of in some measure helping themselves. How then are the two classes of agricultural workers, namely, the tenant or leaseholder, and the poor white or bijwoner, to receive assistance? It seems to me that the solution of the problem in both cases comes within measurable distance through the medium of

The Co-operative Association.

Thus arose in European countries the profound economic significance of the various types of credit associations referred to earlier in this address. The essentials of the success of all type of peoples' credit "banks" may be expressed in the word "Character," or rather "Associated Character." It was discovered that the group of workers in a given area knowing each other personally were extremely careful in any scheme of associated effort

to eliminate the more hopeless and thriftless, and the evolution of the borrowing unit gradually rose to become synonymous with thrift and industry. In the conditions of this country the application of unlimited liability to the classes for whose benefit it would be of immediate value presents undoubtedly far-reaching difficulties; but I am confident that the establishment of associations of this character is not by any means without hope. The second class of persons referred to heretofore may be provided for by creating by legislative enactment the ordinary lien which prevails elsewhere in the case of borrowers upon all chattels and movable property. The co-operative group with unlimited liability receiving loans for the preparation of land for crops, the purchase of seeds or machinery or farm animals, should undoubtedly prove a sound borrower if only sufficient care were exercised in its organisation. Where every member becomes directly interested in the work performed by his neighbours, and where everything he possesses is not merely under pledge for his own honesty but the honesty of those with whom he is associated, a moral security of great force is unconsciously developed which is of much greater value than even the material goods which may be regarded by the lender as the basis of the guarantee. But assuming that the State or the financial institutions of the country will not make advances to the small capitalist or leaseholder, there is a further means of assisting him by advances upon the security of his produce A Co-operative Society with a collecting depôt for the output of its members, to which in its corporative capacity ownership entirely passed with the deposition of the goods, should be enabled to make advances upon a conservative basis of valuation pending sale. In this respect I am bound to say that the banks of the Colony have entertained proposals favourably from Co-operative Societies to assist them by means of what may be described as

The "Coupon" System

This scheme roughly means that a Co-operative Society provides a Central Depôt where it receives and stores the produce of its members through its secretary or other responsible officer, issues to such members a coupon certifying that the goods have been received, scheduling their quantity and character, and setting forth the estimated value at current market prices The certificate of the Society so prepared becomes negotiable at a local bank, the branch manager using his judgment as to the extent to which he shall advance upon the articles which have passed from the possession of the member to that of the Co-operative Society. Advances ranging from 50 to 75 per cent. may thus be made, the Society being charged with certain arranged rates of discount for the period of time which intervened before realisation of the produce. The rate suggested by the banks for work of this kind are so far somewhat high; and the point I am anxious to emphasise before this Institute is that in view of the security offered, and the fact that the work in itself is a direct incentive to increased productive effort, special consideration should be given to the possibility of making special rates in such cases. For example, if the ordinary rates for discounting farmers' bills in the district on good security be say 7 per cent., the rate to be charged by banks to a Co-operative Society under the conditions referred to might be fixed at 1 per cent. lower.

Bywoners or Poor Whites.

The position of the third class of borrowers who are commonly referred to as the bijwoner or poor whites, is deserving of special attention, and anyone who has given any thought to the circumstances surrounding their

lives cannot help feeling that the foundations of comparative permanent prosperity among them can only be laid through the introduction of the Raiffeisen Credit Society. This class is entirely removed from the purview of the ordinary financial bodies, and peculiarly comes within the province of State aid. But how is State aid to be administered? It seems to me that a beginning may be made by setting aside a limited sum for the purposes of an experiment, as has been done in Ireland, and judiciously advancing small amounts to well-organised associations of the more industrious, with the co-operation and support of the local clergymen or other persons of influence. There is hardly any district in the Colony where among the poor whites a certain number cannot be selected whose industry warrants their being entrusted with small sums for the cultivation of land, the purchase of stock, or other work of similar character. It should always be possible for the local clergymen, acting in conjunction with the magistrate, to bring together a certain number of such people willing to work in the direction of raising their standard of comfort, if the means were only afforded for the purpose. The persons so selected would form the nucleus of the agricultural credit society on the principle of unlimited liability. For the purpose of illustration, let us say that twelve such persons are forthcoming in any particular locality, and that each with the loan of ten pounds advanced at say six per cent per annum could undertake in one form or another some small productive enterprise, the results of which would largely depend upon its own energy and application. The whole property of the group, either *in esse* or *in posse*, would become pledged for the total amount passed, in this case £120, and it would be the interest of each to influence as far as possible the operations of his neighbour; and it would be the direct interest of all to take care that loans were applied to the special purposes for which they were negotiated Under proper supervision it has invariably been the case, even among the most depressed communities, that mutual responsibility thus effected produced almost at once personal effort otherwise unattainable; and I think the time has come when the test of universal experience might be applied to the circimstances of these poor people here. A few such Associations started successfully would gradually influence other districts by example, and the gloomy and almost hopeless outlook among the very large section of the community might gradually be dispelled

It is not for me to say how far these suggestions may be of practical use in directing the thought of this Institute to the solution of pressing problems, but conscious as I am of the enormous influence which the banks of the country exercise in South African economics, I am confident they will receive thoughtful consideration Every section of the community is face to face with the great problem of dealing with what is generally spoken of as a crisis in our affairs, and in the vast complexity with which national reform is surrounded, not the least pressing is the organisation of agricultural finance Its solution means everything to the future of the country The welfare of every interest is bound up with the great industries upon the land, and I am sure that bankers can in very considerable measure contribute to its solution.

THE FRUIT FLY (CERATITIS CAPITATA.)

(By C. P. Lounsbury, B.Sc., Government Entomologist.)

The season of 1906 in the Eastern Province seems (writes the Government Entomologist in his Annual Report) to have been the worst for the Fruit Fly (*Ceratitis capitata*) ever experienced. This insect remains active throughout the winter, and its relative abundance in any season appears to depend chiefly upon conditions enabling it to survive in comparatively large numbers until fruit, which it attacks, is again abundant. Not uncommonly it is extremely destructive one season and scarce, except in large fruits, in the one following, and *vice versa*. It is assumed that large numbers of adults survive some winters and account for a relatively heavy infestation of apricots and early peaches. Succeeding generations attack the later fruits. In some parts survival through the winter sometimes apparently depends on the concurrence of winter fruits, in which a generation may be passed. Ordinarily peaches and nectarines and some pears only suffer very severely, but last year over large areas apricots, figs, pears, plums, apples and quinces were almost all attacked. The Japanese plums have a name for immunity, and it was a surprise that they suffered. Of apples the Late Bloomer variety seemed to be troubled least. The Eastern Province Entomologist found that even grapes were infested to a slight extent. Ordinarily the flies escape observation unless looked for closely, but in this season their abundance made them conspicuous; in some gardens in the east it was not exceptional to see half-a-dozen on a single fruit. Eggs were deposited even in pomegranates. The south-western fruit districts were not troubled to more than the average extent. Observations on a number of farms here left it evident that the presence of winter fruits may seriously aggravate the trouble. It chanced that there was almost no sale for Bitter Seville oranges in 1905, and that consequently this fruit was not removed from the trees until very late in the season on a number of farms. Large quantities of such fruit became infested and bred flies in the winter and spring, which in turn devastated the peach crops in surrounding orchards. Peaches grown on farms only a few miles away where little or no citrous fruit is grown escaped attack almost entirely. Loquats in some cases seem to account for an increase in number of the flies early in the season. Obviously it is important wherever deciduous fruits are grown commercially to have all winter and spring fruits cleared from the trees as soon as practicable after it matures, and to be specially careful that no waste fruit remains. Many growers who are very particular about picking up daily all stone fruits in their orchards give no heed at all to citrus fruits and loquats in their home gardens. That the frequent gathering and effectual disposal of infested cultivated fruit is often disappointing as a means of checking the pest is due somewhat to its prevalence in certain wild fruits. The Kafir Plum (*Harpophyllum caffrum*), the Kei Apple (*Aberia caffra*), and the Red Passion Fruit (*Passiflora cœrulea*) seem the more important of these fruits. Some specimens have also been reared from the Prickly Pear and from Monkey Apple (*Royena pubescens*). The far greater abundance of wild fruits in the East than in the West doubtless in part accounts for the greater trouble with the pest, and the dry winter of the East also doubtless favours the pest.

MEASURES OF CONTROL.

Hitherto the only measures recommended for dealing with the insect have been the gathering and destruction of infested fruit, and the netting in of trees. For nearly three years, however, the Eastern Province Entomologist has been experimenting with sprays designed to poison the flies before they laid their eggs. The mixture now adopted for the work consists of twenty-five gallons of water poisoned with one pound of arsenate of lead, and made attractive by the addition of two gallons of treacle or a proportionate quantity of sugar. This is coarsely sprayed over the trees. Fruit flies in confinement eagerly lap up the sweet from the foliage and are poisoned thereby, but it will take years yet to determine the value of the measures in practice. An extensive test was made in 1905, but in that season the pest gave little trouble in orchards surrounding those sprayed, so no good result was shown. In 1906 the results were distinctly encouraging, but swarms of fruit-sucking moths swept off most of the peaches which the spraying was expected to save. A satisfactory crop of apples, however, was harvested, and its good condition is thought to have been due largely to the spraying. Excessive rains have removed most of the poison soon after its application for the 1907 crops, and up to the time of writing, February 1st, the indications are that the pest will not be strongly in evidence even where no preventive measures have been taken. The severe winter appears to have almost exterminated the insect, despite the enormous number of adults bred in the fall

COLD STORAGE FATAL TO THE MAGGOTS.

Cold storage appears to be fatal to the maggots. Indirect evidence to this effect has been brought to my notice several times, and this year a direct test was made. A number of boxes of maggot-ridden peaches were put in the Harbour Board Cold Store, where the temperature is maintained at 38° to 40° F One box was removed at the expiration of seven days, and live maggots in abundance found. Another box was examined at the end of fourteen days. Every peach contained maggots, but only five showing signs of life were found in the box. A third box was opened at the end of three weeks. Each peach yielded from three to twelve dead maggots, but not a single living one was found Most of the dead maggots were quite fresh looking, but those kept were found to discolour in a few days. Further tests will be made during the present season. Fruit shipped to England is cold stored about three weeks before it is marketed, and fruit sent to the United States for a week longer, and hence the danger of South African fruit carrying the pest to those countries is extremely remote. In my opinion there is no danger at all Fruit shipped oversea is, as a rule, very carefully selected and taken from the trees before the stage of maturity at which oviposition by the fly is likely to have taken place in ordinary seasons. Moreover, it should not be forgotten that the fly readily attacks oranges and other fruits in the South of Europe, the Azores, and Madeira Islands, from which fruit is shipped to northern markets without cold storage. Maggotty oranges have been imported in England over many generations without the pest having even temporarily established itself, in support of which it may be mentioned that an Entomology published about a century ago (Kirby and Spence) alludes to the common occurrence of maggots in fruit from the Azores. Then again the fly is found, to a slight extent, over a large part of France, south of Paris, and doubtless owing to climatic conditions exceptionally favourable for its hibernation in the previous winter, it did a good deal of damage in gardens around Paris during the past summer.

CHEDDAR CHEESE-MAKING.

By R. Silva Jones, Government Dairy Expert.

Concluded from page 26.

Cutting the Curd.—When the curd is ready to cut, that is when the coagulation has finished and the curd is about to sink and the whey commences to ooze slightly through at the top, it should break away perfectly cleanly from the thermometer when put in diagonally and lifted out. It shows a clear break, and not in the form of a jagged break. Another very good way is by applying the bent finger to the curd; if the curd sticks it is not ready, if clean, then it is ready to cut. The curd is now ready for cutting with the two knives as shown in illustration.

I prefer to use the vertical knife first, cutting lengthwise and then across, and afterwards with the horizontal knife. The object of this cutting is to facilitate the expulsion of whey, and by cutting the curd into small pieces, heat can be applied evenly, when by the action of the rennet and of the heat the curd contracts and expels the whey. As soon as this process is complete, wash off the hands and arms, and with the hands thoroughly clean off any curd adhering to the sides or bottom of the vat, particularly the corners. But work very slowly and quietly, the curd is very soft still, and easily breaks up, which means loss. If your curd is a "fast worker" or has a considerable amount of acidity developed, cut it smaller, as it is more easily cooked, and the whey will be more easily expelled.

Slow stirring with the hands should continue for ten to fifteen minutes before heat is applied.

The process of cooking the curd, that is of heating it up to about 98° to 100° Fah., according to the season of the year, is one of the most important in the whole process, and I think that a great deal of the nuttiness and mellowness depends upon the proper cooking of the curd, and the worker must by practice and experience find out a lot that it is well nigh impossible to write on paper. After the curd has been gently stirred in the whey for about fifteen minutes, heat can be applied, either by putting hot water into the jacket or by steam, in accordance with one's arrangements. The curd rake is best used after the mass has reached the temperature of 90° Fahr., the curd is then sufficiently strong to replace the hand stirring, but care must be taken to see that the corners are kept well free from curd, or it will become scorched against the hot inside of the vat. The curd must not be heated too quickly, say about one degree for every five minutes. The time taken from the completion of cutting to the finish of the cooking process should occupy about 45 to 50 minutes.

In the case of a fast-working curd a different method altogether should be employed, as your object is to as soon as possible get the curd out of the whey, and to do this add a little more rennet, cut the curd smaller, and as soon as possible start either slowly dipping the whey out

or by a syphon, and allow it to run slowly away during the process of cooking, until you have it down to the level of the curd. Heat 2° higher and hand stir all the time. If the curd is still very acid, as soon as cooking is complete, run off all the whey and add water of a similar temperature and thoroughly wash the curd, and then let run off. This frees the curd of a lot of whey and necessarily retards the acidity. In the case of a gassy curd, or one that contains a lot of pin holes, and is quite spongy, give the same treatment, only the cheddaring process must be continued until all the gas has escaped and the spongy mess broken down. The cooking temperature must be varied according to the season of the year and the richness of the milk. In spring, with a low percentage of fat, a lower temperature is necessary, and *vice versa* with a richer milk a higher temperature is necessary, as rich milk tends to retain moisture. This combined with the fact that lesser moisture is necessary on account of the softening influence of the extra fat on the body of the cheese, makes it imperative to expel more moisture, and consequently a higher temperature is necessary, and it can go up to 104° Fahr., at seasons when the milk is very rich.

In the ordinary way the curd is now left to sink in the vat to mat together and for the acidity to increase, the lid being put on to prevent any drop in temperature. Tests must occasionally be made to ascertain the amount of acidity developed. This is done by heating an ordinary piece of iron to slack heat—clean it well off, and from the vat take a small handfull of curd; press the whey well out of it, and then press the curd against the hot iron and slowly draw it away, when it will be seen that the curd adheres to the iron in the form of very tiny threads, and it is in accorandce with the length of these threads that the acidity is judged. The proper length at this stage should be about ¼ of an inch, but even this varies according to condition; with a rich milk allow the threads to be longer. If the curd will not correspond to this allow to remain for ten minutes and test again, but in case it shows a greater length run off the whey with all possible speed. By fixing in the strainer supplied with the vat for this purpose the whey can be run off, and the curd left in the vat. The curd is now lifted from the vat on to the cooler, a cheese-cloth having been previously laid over the bars, so that, being kept well covered all the time, and in about ten minutes is cut into strips and 6 in. square, turned over, this turning being repeated every ten to fifteen minutes. Do not pile the blocks of curd one on top of the other, but to facilitate draining I prefer to put the end of one piece on to the end of another each time. It is essential all through this process that the temperature be kept up to 90° Fahr. and above. If it is allowed to go below this it is liable to become of a soapy consistency; tests can now be made with the hot iron again to ascertain the degree of acidity, and if the threads on the hot iron extend from ¾ to an inch in length, it is ready for milling. This naturally varies as previously explained.

The mill that I prefer to use is the Australian pattern that cuts the curd into fingers with a clean cut; the old pattern tore and bruised the curd too much, which resulted in a loss of butter fat. An illustration of the former is shown, and I strongly recommend it in preference to the old pattern. The curd, when passed through the mill, should be well aired and allowed to mature. When the curd has obtained a nice silky texture, and smells very much like fresh butter, it is ready for salting. The temperature must not be allowed to fall too much, but by the time it is ready for the salt it should be about 84° Fahr. Salt should be added at the rate of about 3 lbs. to the 100 lbs. curd, or what is sufficiently close to say, to every 100 gallons milk. A table for salting is appended:—

Table for Salting.

Gals.	Lbs	Ozs.	Gals.	Lbs.	Ozs.	Gals.	Lbs.	Ozs.	Gals.	Lbs.	Ozs.
1	...	½	50	1	8	100	3	...	150	4	8
3	...	1½	52	1	9	102	3	1	152	4	9
5	...	3½	54	1	10	104	3	2	154	4	10
7	...	4½	56	1	11	106	3	3	156	4	11
9	...	5½	58	1	12	108	3	4	158	4	12
11	...	6½	60	1	13	110	3	5	160	4	13
13	...	7½	62	1	14	112	3	6	162	4	14
15	...	8½	64	1	15	114	3	7	164	4	15
17	...	9½	66	2	...	116	3	8	166	5	...
19	...	10	68	2	1	118	3	9	168	5	1
21	...	11	70	2	2	120	3	10	170	5	2
23	...	12	72	2	3	122	3	11	174	5	4
25	...	13	74	2	4	124	3	12	176	5	5
27	...	14	76	2	4½	126	3	13	178	5	6
29	...	15	78	2	5	128	3	14	180	5	7
31	1	...	80	2	6	130	3	15	182	5	8
33	1	1	82	2	7	132	4	...	184	5	9
35	1	1½	84	2	8	134	4	1	186	5	10
37	1	2	86	2	9	136	4	2	188	5	11
39	1	2½	88	2	10	138	4	3	190	5	12
41	1	3½	90	2	11	140	4	4	192	5	13
43	1	4½	92	2	12	142	4	5	194	5	14
45	1	5½	94	2	13	144	4	6	196	5	15
47	1	6½	96	2	14	146	4	7	198	6	...
50	1	8	98	2	15	148	4	7½	200	6	...

If the salt is added at too high a temperature it is likely to cause butter socks in the cheese, which naturally destroy the appearance when cut, as will also too rough stirring in of the salt. Great care should be taken to see that the salt used is good and clean, and to see that it is not tainted, as salt, being a chemical compound, readily absorbs taints and odours from being kept in an unclean place. In the case of curd from over ripe milk more salt should be added, as also is the case with a wet curd, which sometimes happens.

The salt being weighed out in accordance with the scale, it should be added half at a time, and well, though quietly, stirred, to ensure it being equally mixed.

The curd must not be put to press until the salt has thoroughly dissolved. This can be easily ascertained by the curd having lost its grittiness. And the temperature should not be less than 80° Fahr., or the curd will not close together properly, and when cut will be found to be full of holes.

The mould should by this time have been got ready, that is with the cloth bandage put on, allowing about 1½ inches over at the top and bottom for the trim over, and the bottom cap previously put in. It is very necessary that all the cheese should be made as nearly one weight as possible, it greatly aids the sale of a good article, and therefore it is necessary to weigh the curd into each mould. Practice will show exactly how much green curd to put so that the mould will come nicely home and do away with the unsightly rim that is left if too much curd is put in.

The pressing should be commenced slowly and regularly. With the lever presses as shown in the illustration it will be seen that the pressure is continuous, but it should be kept well screwed up. Keep the long lever hanging at about right angles to the machine. If this be done, it is not possible to get any relaxation of weight, and in about one hour's time the weights can be applied. First the small one, later on substitute it for

the big one, and later on again put both weights on, screw well up, and leave for the night. First thing next morning the cheese must be taken out of the mould, or so far out that one can see the two ends. First look to see that the bottom end cloth has nicely folded, leaving a good square edge. If it has, leave it; then pull up the cloth from the mould, put a top on the cheese, neatly turn the cloth down, cutting any off if it is too long, and return to press again. Then leave it there with full pressure on as long as possible, just giving oneself time to take the cheese out. Have the moulds washed ready for the next lot of curd. This will always give the cheese nearly twenty-four hours in the press, which is ample.

In order to prevent too much evaporation from the cheese in its early stage of ripeness, it is necessary to give it a temporary coat, and this is done in two ways, either one being very satisfactory. The first is to scald the cheese when the cheese is first taken out of the press to pull up the cloth. The cheese is dipped in water of a temperature of 120° Fahr. and left there for about one minute, then taken out and replaced in the mould. The other is, after the cheese has finally come out of the press and allowed to dry off, to paint it with good sweet lard slightly warmed so that it can be put on with a brush. Either of these will prevent evaporation in the early stages and give the cheese a temporary coat.

The cheese is now ready for the curing room, and it is preferable to have two rooms, the first in which the cheese can stand for a fortnight or three weeks, and should be of a temperature of about 70° Fahr., and from here they are taken into the second room, which should be kept about 60° Fahr.

For the first month or six weeks the cheese requires to be turned once every day, and care must be taken that in turning the edges are not broken. They require to be lifted well off the shelves to be turned. After the first six weeks, turning every other day is sufficient, but daily will do no harm, and if time permits daily is preferable. If it is found, as is often the case, that the cheese begins to develop gas, and lifts slightly, as soon as it is noticed, the gas should be let out by pricking it with a skewer in the place where the lifted rind is noticed. If this is not done the blowing will cause the rind to separate from the cheese, and the look of the cheese will be damaged.

These rooms should be scrupulously clean and free from moulds, and in the damp weather, if it is seen that moulds appear, a good preventive is to spray a 10 per cent. solution of formaline about the room, but do not allow the solution to get on to the cheese if possible.

Before every season commences these rooms must be well cleaned out and whitewashed, and the shelves well scrubbed down. If the mould should bother very much, the burning of sulphur in the room will assist greatly.

The date of the making of every cheese should be plainly stamped thereon, in fact, I strongly advocate keeping a daily record of the work. This will be found of tremendous assistance, as in case of extra good or indifferent cheese, the cause can then more easily be ascertained, and recommend the following record to be kept daily.

A record of this description ought certainly to be kept not only for the benefit of the worker, but it must be remembered that the industry in the Colony is in its infancy, but is, I think, bound to become a great factor, and we have absolutely no data of any description to work upon for the formation of dairy statistics. This would be a very great help in time to come, both from a statistical point of view and also from the point of view of tracing errors, and for working improvements.

Where the acidimeter is used in connection with the different acid tests, columns can also be left for the results obtained.

DAILY RECORD OF CHEDDAR CHEESE MAKING.

Date.	Amount of Milk in Gallons.			General condition of Milk.	Amount of Starter.	Setting Temperature.	Time of Adding Rennett.	Test.	Amount of Rennett.	Time of Cutting.	Cooking Temperature.	Hot Iron Test for Milling.	Amount of Salt.	Weight of Green Cheese in Lbs.	Weight of Ripe Cheese in Lbs	General Remarks.
	Evening.	Morning.	Total.													

It is also highly essential that every cheese should be branded before it leaves the factory, it is far better for trade purposes. This can best be done by an ordinary stencil plate, cut round to fit the top and bottom of cheese. Either give the name of maker, or have a special name for the brand, and paint it on with ordinary black lead before it leaves the factory.

ESTIMATES FOR PLANTS AND CONTINGENCIES.

For the convenience and information of farmers I give estimates for the supply of cheese plants from 100 gallons per diem up to 500 gallons per diem. The prices quoted are by Messrs. D. E. Hockly & Co., East London, and are for the very latest and most up-to-date machinery, and include all that is necessary. The utensils are all of the very best make upon the market.

Estimate for 100 gallons per diem.

	£	s.	d.
1 Improved Oblong Cheese Vat, 100 gallons	16	10	0
1 Double Lever Cheese Press	9	5	0
1 Improved Curd Rack and Cooler, 60" x 28"	8	10	0
1 Improved Curd Mill and Cutter	10	10	0
1 Pair Steel Curd Knives	3	0	0
1 Curd Scoop	0	5	0
1 Strainer for hanging on Vat	1	1	0
1 Wood Curd Rake, £1 7s. 6d.	1	7	6
1 Portable Boiler, 75 gallons	10	0	0
	£60	8	6

Estimate for 200 gallons per diem.

	£	s.	d.
1 Improved Oblong Cheese Vat, 200 gallons	24	0	0
1 Single Lever Cheese Press	6	5	0
1 Double Lever Cheese Press	9	5	0
1 Improved Curd Rack and Cooler, 72" x 30"	10	10	0
1 Improved Curd Mill and Cutter	10	10	0
1 Pair Steel Curd Knives	3	5	0
1 Curd Scoop	0	5	0
1 Strainer for hanging on Vat	1	1	0
1 Wood Curd Rake, £1 7s. 6d.	1	7	6
1 Portable Boiler, 90 gallons	11	0	0
	£77	8	6

Estimate for 300 gallons per diem.

	£	s.	d.
1 Improved Oblong Cheese Vat, 300 gallons	30	0	0
2 Double Lever Cheese Presses	18	10	0
1 Improved Curd Rack and Cooler, 96" x 33"	12	10	0
1 Improved Curd Mill and Cutter	10	10	0
1 Pair Steel Curd Knives	3	10	0
1 Curd Scoop	0	5	0
1 Strainer for hanging on Vat	1	1	0
1 Wood Curd Rake, £1 7s. 6d.	1	7	6
1 Steam Generator	18	10	0
	£96	3	6

Estimate for 400 gallons per diem.

	£	s.	d.
1 Improved Oblong Cheese Vat, 400 gallons	37	10	0
1 Single Lever Cheese Press	6	5	0
2 Double Lever Cheese Presses	18	10	0
1 Improved Curd Rack and Cooler, 96" x 33"	12	10	0
1 Improved Curd Mill and Cutter	10	10	0
1 Pair Steel Curd Knives	3	15	0
1 Curd Scoop	0	5	0
1 Strainer for hanging on Vat	1	1	0
1 Wood Curd Rake, £1 7s. 6d.	1	7	6
1 Steam Generator	18	10	0
	£110	3	6

Estimate for 500 gallons per diem.

	£	s.	d.
1 Improved Oblong Cheese Vat, 500 gallons	42	10	0
3 Double Lever Cheese Presses	27	15	0
1 Improved Curd Rack and Cooler, 96" x 33"	12	10	0
1 Improved Curd Mill and Cutter	10	10	0
1 Pair Steel Curd Knives	4	0	0
1 Curd Scoop	0	5	0
1 Strainer for hanging on Vat	1	1	0
1 Wood Curd Rake, £1 7s. 6d.	1	7	6
1 Steam Generator	18	10	0
	£118	8	6

Australian Pattern Telescopic Cheese Moulds.

As may be required at the following prices:—

To make cheeses 6 lbs. weight, 7" diameter, about 5" high, 15s. each.
To make cheeses 10 lbs. weight, 7" diameter, about 8" high, 17s. 6d. each.
To make cheeses 20 lbs. weight, 11" diameter, about 6½" high, 22s. 6d. each.
To make cheeses 40 lbs. weight, 13½" diameter, about 6½" high, 27s. 6d. each.

Curd Rack and Cooler can be procured in any size as may be desired.

Price List of Sundries.

Cheese Bandage, 7" Moulds, 6 lb. and 10 lb. size, 10d. per yard of 3 Tubes.
Cheese Bandage, 11" Moulds, 20 lb. size, 8d. per yard of 2 Tubes.
Cheese Bandage, 13½" Moulds, 40 lb. size, 5d. per yard of 1 Tube.
Tops, 7", 1s. per 100.
Tops, 11", 2s. 6d. per 100.
Tops, 13½", 3s. 9d. per 100.
Cheese Straining Cloth, 9d. per yard.
Graduated Measure Glasses, 2s. 6d. each.
Cheese Tasters, 2s. 6d. each.
Cheese Brushes, 2s. 6d. each.

Chr. Hansen's Dairy Preparations.

Cheese Colouring, in ½ gallon bottles, 9s. per bottle.
Rennet Extract, ½ gallon bottles, 9s. per bottle.

These prices are free on rail at East London, and can be slightly reduced in cost, but if they are reduced it is at the expense and economical efficiency of the plant. For instance, the imported curd mill at £10 10s. can be substituted by the old style of mill at £3, and the steam generator in the largest two sizes can be done away with. But the latter would have to be substituted by a boiler, which would save but little and greatly increase the labour. I strongly recommend that the substitutes that I have mentioned be not used, as the original estimates are framed with a view to complete efficiency as well as the curtailment of expense.

With regard to the moulds, they have not been included in the original estimates because of the different sizes, and it is not likely that everyone will prefer to make the same size cheese. Moulds are made in four sizes, viz.: 6, 10, 20 and 40 lbs., but for our market I think the 20 lbs. cheese the most suitable. One would naturally make to the requirements of the market, though it must always be remembered that the larger the cheese the less waste there is on account of a smaller proportion of rind, and that the larger cheese ripens better than the smaller ones.

For the sake of estimating the number of moulds required, it can be taken that a 20 lb. mould would suffice for 20 gallons of milk and so on, and the number of these required must therefore be added to the cost of plant, but it is always better to have a couple of moulds too many in case of an accident, and no matter what size mould is determined on always get a few small ones, as the curd will not always evenly weigh out between the large moulds. What is over can be made into small cheeses.

This is practically the whole of the capital required for the plant, but there are still a few what may be termed working expenses, viz.: bandages and tops, the size of these will be the same as that of the moulds. Sufficient for the first season should be purchased with the plant. A few yards of cheese straining cloth will be required to make a cover for the curd rack in the cooler, and two measure glasses for measuring rennet and also a cheese brush.

With reference to the rennet and colouring the quotation is given for and at per one bottle, and of course seems high, but in the case of ordering a plant and intending going in for cheesemaking, it would be far better to order a fair quantity in original cases for importation, when a much lower quotation would be given.

Rennet and colouring both keep well as long as they are well corked and kept out of the strong light, although one should hardly order more than is requisite for one season.

Klapmuts Stock Fair.

Attention is directed to the next Stock Fair to be held at Klapmuts on September 5, when some excellent pedigree and sound stock will be offered. Among these will be some pure-bred young Friesland bulls, some Jerseys, and Clydesdale horses. This departure on the part of the Paarl Farmers' Association deserves attention and support. Anyone desiring to enter stock should communicate with the Secretary, Mr. R. Lamont, Elsenburg, Mulder's Vlei.

REGULARISING OUR AGRICULTURAL SHOWS.

By Cuthbert A. Pope.

Our Government, through the Agricultural Department, is liberal in the matter of aid to the numerous agricultural societies when holding a show. And rightly so, as these shows, if properly conducted, are capable of bringing great advancement to the cause of agriculture, the cause which is generally admitted now to be of the first importance, if we are to become a permanently prosperous community. It is questionable if the average farmer is in a position as yet to make use of the many co-operative schemes advanced. He must first be taught the difference between a good and an inferior article, and the reason why the one is superior to the other. Then teach him how best to produce on an economical and commercial basis, and the time will be ripe for co-operation to dispose of the product. The whole process can, however, reasonably go on at one and the same time. The country at present can be likened to a wagon sunk in a slough, the front oxen are pulling but the hinder ones won't; ultimately, no doubt, we shall all pull together and lift out the load, but not before the whip has thoroughly warmed us.

When an agricultural expert gives a lecture, the progressive men, who need it the least, are the only ones who attend. When the district show is held, all the farmers within reach come to see it; not to learn, mind you, only for an outing. Has it never occurred to anyone that here is the finest opportunity ever offered of getting at the man who does not read, for of what use are reports to him?

Agricultural shows, so far as I am aware, are the only form of amusement supported by Government. For to-day our shows are really only an amusement as regards the many, an advertisement as regards the few, and an education to no one, unless we except the judges, and the odd man who tries to ferret out something at the risk of—to put it mildly—being thought a nuisance. No wonder the taxpayer grumbles at this expenditure of public money in these "hard-up" times, for he cannot see any adequate return for it. And if we look closely into the methods often practiced at the smaller shows we can but agree that the only ones who really benefit are those who receive the prize money.

We generally find that our governing body is very cautious in the giving of public money, and insists on being assured that such grants are spent in a right and proper manner. But what do we find with regard to show grants? Why that twenty-five men can club together and claim from funds provided any amount they desire, and if that amount is spent in prizes awarded or show-yard improvements, and a certain relative amount given by themselves, they have full discretion to expend the grant in any way they choose within these limits, which admit of very wide interpretation. In one case the money is carefully spent, in another carelessly. More often than not the funds are wasted. Wasted, in that sufficient benefit does not accrue to the general community. Many are not in favour of small shows for this very reason, but the large ones cannot be held blameless in this respect either, and it is their place to lead. At present

there is great competition between societies as to which shall hold the larger show. Local conditions will, however, always decide this point. The aim should be, not size and effect, but the best way to benefit agriculture in all its branches. The Agricultural Department has also this end in view, and in the control of the grants it has the strongest possible guiding power if it cares to use it. On the other hand, we must not forget that the success of a show depends mainly on its local supporters; they also contribute funds and much work. This self-help must be encouraged, Therefore direct Government control would be most inadvisable. But in the Agricultural Union we have a body composed of delegates from most of the agricultural societies, and "all" could be substituted for "most," if it were felt that sufficient cause existed for affiliation. At present the Union is, like so many other bodies, merely a medium for conveying resolutions, and the feeling exists that these will be checked and sifted before being acted on, so that the real responsibility is vested in another place. Much greater support would be accorded, much greater circumspection used, were it felt that decisions arrived at were binding and real. It is of little use condemning unless a remedy is proposed, and the following, though far from perfect, is offered for the mature consideration of those interested, in the hope that some improvement may result.

Let the Agricultural Union be created an incorporated body as regards dealing with show matters. Let it be notified that assistance from the public funds will only be granted to such societies as conform to the regulations laid down by the Union. That puts power into the hands of the Union, but it is a body composed of delegates from the societies themselves. The Agricultural Department as the higher power would still have the right of veto, and any proposals from that Department on show matters could be referred to the Union for their opinion. Such regulations should only apply to societies claiming assistance from grants, others (if any) would be at liberty to do as they pleased. The object being to ensure that the public money is used to the best educational advantage, it would be unnecessary, and inadvisable, to curtail in the very least the liberty of the individual society, unless to this end. In the first place, shows might be divided into two sections, viz.: a limited number of open or premier shows, and the remainder local shows. Local not to be taken to mean district as defined by legal boundaries, but area as found most convenient by the residents, even two or more districts if desirable. This would not interfere with any community holding their own show, or throwing in their lot with one already established; but overlapping should not be countenanced. The local show is the only medium we have of getting at and educating the ordinary farmer, who would never leave his home to attend a show at a distance. It is only proposed to deal here with certain regulations which the Union might lay down for the guidance of local shows.

1. The total value of prizes for which assistance is claimed offered at any one local show shall not exceed £ . Two-thirds of such amount to be awarded in classes confined to residents of the area.

This would act as a check on expenditure, but would not present full freedom in offering prizes for which no assistance was claimed. It would also ensure the show being primarily a local one, the object being the encouragement of local effort as opposed to outside professional exhibitors. Nevertheless, certain classes should be open, to provide for stay-at-home residents seeing something besides their own, and giving an opportunity to any leading exhibitors there may be in the locality to exhibit without competing with lesser lights. Schedules might also be framed, stating certain limits to the individual sections, as "Sheep not to exceed £ ," and so on. No restriction, of course, being intended where assistance is not claimed.

2. The whole of the first day of the show, and the forenoons at least of the succeeding days, to be devoted entirely to judging and educational subjects. Not less than lectures or practical demonstrations on the prominent agricultural industries of the locality to be given by qualified experts during the period of show.

A one-day show is of little use—unless on a very small scale—the time is too limited, and everything is rushed. This would virtually enforce at least a two days' show, as most societies will require some time to indulge in amusement for the sake of attraction. The educational side is, on the other hand, the main object, and every advantage should be taken of the exhibits, and the farmers, being at hand, to demonstrate what is required and what is objectionable; either the judges or other experts officiating. But during these hours amusements must be barred. Who would listen to a lecturer telling you how an egg is formed, how to sort wool, or drive bees, or the relative value of certain points in fleeces or animals, when there is a chance of seeing a man break his neck in the ring?

3. Societies must apply to the Union at least months prior to date of show stating number and class of stock for which judges are required. Number of classes allotted each judge must not exceed in the case of fleeced animals, or in other sections. Locally appointed judges will only be allowed in cases where Union judges cannot be secured or attend.
4. The names of such judges as selected by the Union will be given to the society at last weeks prior to date of show. The fees for each judge shall not exceed £ . Such fees to be forwarded to the Union by the society when called upon to do so.
5. Judges in every section must furnish a short report on each and every exhibit judged by them. This report to be affixed in close proximity to the exhibit.
6. Societies must instruct the judges to award prizes in all classes where the exhibits are of sufficient merit, whether there is competition or otherwise. Also to withhold awards in classes where in their opinion the exhibits are not of sufficient merit, or not sufficiently true to the type for which the class is intended.

Judges are generally selected by the committee, many of whom in the smaller societies are exhibitors. This sometimes leads to unpleasantness. It would be a relief, and would ensure a better selection and strict impartiality, if the Union could supply judges from their own list on demand. This should be easily done, as it could be ascertained beforehand who are willing to act, and who not; whereas now much time is wasted and trouble involved by societies asking men to officiate who have not the time, or the wish, or who are engaged elsewhere. The matter of judges is really the most important of all matters connected with shows, and calls for much consideration. It is a question if local judges should be allowed or not. In some cases they could be employed and give every satisfaction, in others there is apt to be a want of real confidence in their decisions, owing to their too intimate acquaintance with local exhibits. In the stock classes I favour only men from other localities.

At the present too, I am inclined to favour the professional type of judge, because such men are more likely to know their business, and be willing to give their reasons, and the tendency would be to bring awards more into line. By professional judges, I mean men who being producers or otherwise, have really studied certain classes of exhibits for many years, men who profess to know, and who consequently have confidence in themselves, and can give well thought out reasons for their actions. There are, I believe, sufficient of such men for the work, without using the same too

frequently for the same show. Men who understand their work prefer too, as a rule, to act alone; and the one great advantage of the single judge system is the elimination of the incompetent. It would be premature at this stage, however, to force societies to only employ a limited number of judges. At present men of character and standing are generally selected, provided they have some knowledge of the class of exhibits to be judged. It does not follow, however, that because a man has farmed largely with a certain class of stock or produce that he has really studied the subject, and there are also different degrees of intelligence; accuracy of eye is an indispensable attribute too. It is probable that there are men of equal character, and better knowledge, but less well known, who could be found willing to act, and the Union is the body to find them. I wish to say here that I am not condemning our present judges *in toto;* many give every satisfaction, and all are deserving of recognition for performing such a thankless task, but we are all agreed that the system needs alteration. At present we want something more than intuitive knowledge and high character, we want men who are willing and capable of stating their reasons; men who can, if required, handle a scale of points. It is a treat to see the judges of fancy dogs, poultry, or pigeons, at work; they are enthusiasts who understand their work, and can always give definite reasons for their actions. There will always be failures and mistakes made, no one is infallible, but time will point out the former, and will bring an increasing number of eligibles to select from. Now one can hardly ever get a judge—experts excepted—to give a reason for his awards, and consequently there is a difficulty in winnowing the chaff from the wheat. I would here suggest that it would not be impossible to follow the example of the Buenos Ayres and some North American shows, in the case of some of the imported varieties of stock, and get a judge from the home of the breed to judge at a few shows for one season; arranging also that he might demonstrate to a few of our judges the relative values of the different points.

A very necessary provision is that societies should engage not to overwork their judges, no judge can do justice if he is required to do too much in a limited time, and it should be made imperative for judges to report on every exhibit judged by them, not only the first and second prize winners, though these would naturally receive greater attention. The visitor or exhibitor is just as much entitled to know why an exhibit is not placed at all, as to know why the first was placed before the second. Often an otherwise good exhibit is unplaced for some one reason, not apparent to any but the judge, a short note of which would clear up all doubts. Any possible damage to the owner's name should not be considered, as he places his exhibit on a public show for public criticism. It would only take a competent man a few minutes to dispose of the pretensions of most of the exhibits in a class, a few words of explanation would suffice.

There is also the matter of remuneration. It seems altogether wrong to ask a man to do one a favour, give him some hard work to do, with the certainty of being grumbled at, and then expect him to fend for himself in a crowded town, and be out of pocket over it all. Legitimate expenses or accommodation should undoubtedly be found. The payment of a fee is another question. There is the expense of the society to be considered, and also the making a trade of the work. On the other hand, a paid judge would feel more bound by instructions, and to give more attention to his reports, and the poor and possibly more competent man would be placed on an equal footing with his more fortunate brother. In any case, if money is to pass it should do so through the medium of the Union.

No. 6 is a very necessary condition. It is not the exhibitor's fault if his is the only entry in a class, and the judge should decide if it is

worthy of a prize or not. Some societies instruct the judge to give only a second, or no prize, where there is no competition. One person sees such an exhibit awarded a second prize, and concludes it is from want of merit, another because it is the only entry. Again, a false standard is likewise set up by awarding a prize to insufficient merit, though there may be several entries; some societies favour this as encouraging exhibitors, but it is wrong. And what is if anything worse, is giving a prize to an exhibit obviously of different type, or not sufficiently well bred of the breed or sort for which the prize is offered; this is sometimes seen at our leading shows. The same standard should, however, not be required at a local show as would be imperative at a premier show.

7. No assistance will be given towards prizes in any class for breeding animals, in which animals of distinct breeds being of different types are allowed to compete together.
8. Assistance will not be given in aid of prizes for machinery or implements or similar articles, unless these are judged when in motion doing the work they are intended for.

It is now generally recognised that it is a farce, and an unjust one, moreover, awarding prizes to machinery without trial. It is, however, equally as great a farce awarding prizes in mixed classes of live stock. Such awards carry no weight. We find say, several breeds of cattle or horses competing for a championship or group prize; at small shows we find a Thoroughbred and a Hackney or a Shorthorn and a Friesland competing together. Such exhibitions do not advance the cause one atom. By all means let societies continue this if they wish, but don't allow five-eighths of the award to come from the public purse.

9. All breeding animals must be paraded before the judges, and if the public is not admitted to the judging of the horse and cattle sections, these must also be paraded when the show is open.

No one can properly judge animals when they are standing in a pen, and it is essential for our cattle and small stock to be able to move freely. The public should also be given the opportunity of seeing the cattle out. With small stock it might be sufficient, if those in the running for the prize were turned loose before the judges for a minute. It is also a very necessary precaution that a veterinary surgeon should examine all prize horses in breeding classes, and certify them sound, before the final award is made. This could not be made a condition at present as veterinary surgeons are often unobtainable.

10. All societies must notify the Union by   in each year of their intention of holding a show in the year following, and state approximately the amount of assistance required.

This has already been advised, but should be one of the conditions enforced.

11. Should the assistance required by the local societies in any one year be greatly in excess of the amount which can be placed on the estimates, it shall be arranged by the Union, that while each society holding a show receive their full grant, the societies shall be divided into two equal and distributed portions, each portion to hold its shows alternating yearly with the other portion.

It is better if funds are inadequate, to hold half the number of shows each year and assist these freely, rather than to hold them all, and cripple each by reducing the grants. In this case local shows would be held every alternate year till times improved.

12. It shall be binding on all societies receiving assistance to accept the date fixed by the Union for the holding of their show, pro-

vided such date is within eight days of the date desired, and of which notice was given when announcing their intention of holding a show. The Union to notify each society of the date fixed not less than months previously.

This condition is absolutely required to prevent clashing of dates.

Many other points will doubtless arise. I have not attempted to deal with merely desirable conditions, but only such as are necessary. Our shows, of course, have done good in the past, and are still doing good, but if regulations similar to these were enforced as a condition of receiving a grant, a great advancement in knowledge would, I feel sure, result, and without unduly interfering with the individual liberty of societies. It may be argued that equally good results could be obtained by simply advising societies to better their methods. I do not believe it. The progressive ones might advance, but uniformity is required, and though most societies would welcome any reasonable solution of the judge question, I fear that the smaller and more conservative would continue as before. The cry of the day is for better technical education in farming matters, and I feel sure, that in our little local shows there is a great opening for improving the man on the isolated farm who never reads; the big shows will never touch him.

As a corollary of the above scheme, it would seem necessary that an official should be appointed during the show season, whose duties would consist in advising, inspecting and reporting on the work of societies claiming assistance, as evidenced by the character of their shows and show grounds, and their methods of using the grants allotted them. An experienced man would not only be a check on doubtful methods, his advice would also be of help to some of the smaller societies.

With regard to grants to show yards, I would suggest that:—

(*a*) Grants made on the pound for pound principle to societies in aid of show-yard improvements shall not exceed £. .... in the case of local shows, in one or more instalments, and where this amount has already been received no further grant will be made.

(*b*) All annual grants from the sum set aside for this purpose to be allotted by the Union *pro rata* to societies entitled to claim.

(*c*) No buildings or show yards erected with the aid of Government assistance shall be saleable until the Government is secured to the amount of the grants made.

(*d*) In the event of an assisted society failing to hold a show for ...... years in succession without good and sufficient reason, buildings or show yards may be sold by the Government on account of the Government and the society.

If a society is started by Government assistance it should be all that is necessary. Big buildings are not really required for a local show, they mostly lie idle all but two days in the year; £2,000 will go a long way if used carefully. To-day the spirit of competition is apparent, one town against another, but the benefit to my mind is doubtful. In any case, the grant should be divided fairly and without favour between all societies.

I would here remark that in the organisation of the shows throughout South Africa, the various Agricultural Unions have a very wide field of work before them, a field which is capable, if properly tilled, of yielding an abundant return in increased prosperity to the farming community.

Since it may be thought presumption on my part advancing a scheme of this nature, I may say that the members of my own society, ever ready to view matters from a broad-minded standpoint, have not only assisted in the construction, but empowered me as their delegate to bring the matter forward at the last Union Congress, if an opportunity offered. I, however, take full responsibility for opinions expressed in this article.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during May, 1907.

Port of Shipment.	Destination.	No. of Packages	Description of Fruit.	Quantities.	Value. £	s.	d.
Cape Town .	German South West Africa.	62	Oranges ...	10,380	31	15	0
" ...	"	1	Naartjes	600	1	10	0
" ...	"	6	Pineapples .	630	3	1	6
" ...	"	163	Apples ..	33,200	60	0	0
"	"	5	Bananas	2,350	4	10	0
" ...	"	5	Lemons .	570	3	5	6
"	"	13	Pears .	1,800	6	19	0
	Totals	252		49,530	111	1	0
Cape Town ..	Portuguese West Africa.	81	Apples .	2,400	12	0	0
" ...	"	102	Pears .	3,200	17	0	0
" ...	"	40	Lemons ...	1,900	8	0	0
" ..	"	80	Apples ..	2,400	12	0	0
" .	"	70	Pears	2,100	10	0	0
	Totals	373		12,000	59	0	0
Cape Town ...	Portuguese East Africa.	60	Apples ...	1,800	9	0	0
" ...	"	30	Pears ...	900	4	10	0
	Totals	90		2,700	13	10	0
Cape Town ...	Germany	42	Pears ...	1,260	6	6	0
" ...	"	14	Apples ...	420	2	2	0
	Totals	56		1,680	8	8	0
Cape Town ...	Mauritius	90	Apples ...	2,100	10	10	0
" ...	"	50	Pears ...	1,500	7	10	0
" ...	"	202	Grapes ...	2,820 lbs.	38	0	0
	Totals	322			56	0	0

FRUIT EXPORT.—*Continued.*

Return of Fruit Shipped from Cape Colony during June, 1907.

Port of Shipment.	Description.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	England	80	Naartjes ...	2,900	17 0 0
" ...	German South West Africa.	130	Apples ..	14,160	43 19 0
" ...	"	76	Oranges ...	12,620	28 7 6
" ...	"	13	Naartjes ...	3,100	7 15 0
" ...	"	4	Bananas .	3,400	7 5 0
" ...	"	11	Pears ..	690	6 15 0
" ...	"	2	Pineapples ...	700	2 10 0
" ...	"	1	Citrons ...	100	0 10 0
" ...	"	4	Lemons ...	580	2 10 0
" ...	"	1	Peaches ..	30	0 15 0
" ...	Portuguese East Africa.	105	Apples ..	2,450	28 10 0
" ...	"	90	Pears ..	3,300	33 0 0
" ...	"	6	Oranges ..	200	1 16 0
" ...	Lobito Bay... ...	200	Pears ...	8,400	41 0 0
" ...	"	160	Apples ...	9.600	80 0 0
" ...	"	30	Oranges ...	2,600	12 0 0
Port Elizabeth	England	25	Pines ...	1,500 lbs.	4 7 6
"	"	47	" ..	2,480 "	8 0 0
"	"	2	" ...	100 "	2 0 0
	Totals	988			325 6 0

CORRESPONDENCE.

Correspondence and contributions are invited on all subjects affecting the Farming Industries of South Africa, suggestions for consideration or hints as to improved methods being particularly welcome. It should in all cases be distinctly understood that we do not hold ourselves responsible for opinions expressed or statements made.

Questions are also invited. In this department, every endeavour will be made to procure the desired information for publication in the next issue, but this cannot be guaranteed in the case of letters received after the 20th of the month. Should a correspondent deem his enquiry urgent, he should say so, and an answer will be returned *through the post* as soon as possible.

All letters or contributions should be plainly addressed: "The Editor of the *Agricultural Journal*, Department of Agriculture, Capetown;" they should be written on one side of the paper only, and be accompanied by the name and postal address of the writer, not necessarily for publication, but as a guarantee of good faith. A *nom de plume* may be attached for publication.

Tobacco Culture in Cape Colony.

To the Editor, Agricultural Journal.

Sir,—With regard to the above subject a report was recently given in the Cape Town newspapers of a sale of Colonial Turkish Tobacco. These reports were very long, though, where it came to the main point, not very clear. A few months ago, however, nine farmers in the French Hoek Valley decided, on the suggestion of Mr. Stella, and with the co-operation of the Government, to conduct an experiment in the planting of Colonial Turkish Tobacco.

On the 8th of June a quantity of about 3,250 lbs. was offered for sale at French Hoek. Prices ranged from 7½d. to 3s. 2½d. per lb., while one of the buyers had stated that a few of the parcels were of exceptionally good quality and even to be favourably compared with the best imported article.

The sale was a success, while the future prosperity of the industry was assured (this much about this part of the report).

Now, if I come to consider this report from a technical point of view, and take it that the main object of Government in imposing an import duty of 3s. a pound on unprepared tobacco, and also in their interest shown in this experimental planting, was to let the farmer enjoy the benefits of this industry, I come, I regret to say, to the conclusion that it is the manufacturer who has reaped the benefits. I base my conclusions on the following grounds :—

The report does not mention the average price paid for the various parcels, and under these circumstances an accurate statement is out of the question. The low prices under 1s. per lb. I will, however, omit, and accept the following return figures :—

⅓ of the tobacco realised	1s. per lb.	
⅓ ,, ,,	2s. ,,	
⅓ ,, ,,	3s. ,,	

thus an average price of 2s. per lb. was obtained for the Colonial Turkish tobacco.

When the cigarette manufacturer is unable to buy *Colonial* Turkish, he has to import the real Turkish article, for which he pays :—

In Cape Town	1s. per lb.
Import duty on unprepared tobacco	3s. per lb.
Total	4s. per lb.

With the new industry the manufacturer at French Hoek is now in a position to buy the same quality at 2s. a lb., so he makes without any trouble a clear profit of 2s. per lb. of tobacco.

Thus, while the farmer receives 2s. a lb. for his tobacco, and from this must be deducted the risk incurred and all possible expenses (always keeping in mind his unprofitable method of culture), then I am certainly not far wrong in maintaining that it is the manufacturer who reaps the benefits of the new industry and who would even like to see the farmers extending their planting operations.

I should like to draw the attention of those interested in this new industry to the following points :—

1. The leaves of the Colonial Turkish tobacco are very small, and the planter will have to prepare 400 or more leaves to obtain 1 lb. in weight, while in the case of ordinary kinds of tobacco 150 to 200 leaves will be sufficient to obtain 1 lb. in weight, and besides this he has the advantage of choosing and buying the tobacco *himself*, which with the imported article he has to leave to the discretion of an *agent*.

2. The process of maturing is liable to cause a great deal of damage, as the tobacco has to be exposed to the variations of the weather for nearly three weeks. This method of maturing compares very unfavourably with the Sumatra method by which the whole maturing process takes place under shelter.

3. Tobacco not being as yet an article of export, the planter has per force to depend on local manufacture for the disposal of his product.

4. Should this tobacco be cultivated on a larger scale and the farmer himself be unable to dispose of part of his product in some form, the chances are decidedly that his crop will bring him only a low return.

It is, however, an encouraging sign to note the enterprise shown by the Government and planters, and I think I may safely assert that the foundation has been laid for the development of a very important branch of agriculture, and an industry which should be thoroughly discussed in all its various aspects.—Yours, etc.,

C. VOKT.
Tobacco Expert.

Rondebosch, June 19th.

Horse Sickness.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I am not sure that you admit matters of a controversial nature into the *Journal*, but I should really like to know why Messrs. De Villiers and Van der Walt say that the nasal frothy discharge is "gall." Is it bitter as gall? Has anyone tasted or tested it? Here during the outbreak we made many *post mortem* examinations, and finding the windpipe full of watery fluid, the lungs waterlogged with it, and fluid round the lungs and sometimes in the belly, we could form no other opinion but that the yellowish fluid was simply the clear serum or watery part of the blood—similar to the fluid that comes out when a dropsy is tapped and resembling the fluid in lung-sickness, except that that of course contains a different virus.

We have to thank Mr. Van der Walt for his recipe. I have no doubt it works admirably in putting a horse's digestive organs to right. But of course he does not contend that real horse-sickness only picks out the animals in poor condition. That we all know is far from being the case. An old farmer and horse-breeder told me of the garlic cure years ago. But as he had been ruined by horse-sickness and lost every hoof, that did not say much for garlic. What always astonishes me is the almighty power claimed for a dose of medicine when it is given to a beast. Two or three pounds of Epsom salts will clear out an ox's inwards and cure it of gall-sickness (so-called), and a dose of castor oil will work wonders with a child that has also been eating what he could not digest; but who for a moment would suggest that a dose of medicine could save a child from measles if he were exposed to it at the infective stage and had never had it before? Yet lots of people would have me believe that a single dose of this or that can, and does abort a deadly disease—*i.e.*, prevent a horse from sickening after the infection has entered its body. For of course the medicine has no right to be called preventive if no disease is in the horse—no enemy to be overcome. You can't prevent a snake from biting you if there is no snake.

I don't believe in medicine in this disease—not a scrap. And I should just like to meet the man brave enough, or foolish enough, to inject real horse-sickness blood into his best horse and then proceed to save it with any cure or preventive under the sun. But I suppose that even after burying his horse he might be like an old woman I knew who carried a potato in her pocket to prevent rheumatism. When after all she was laid up with rheumatism, did she lose faith in her preventive? Not a bit. Traditional beliefs are hard to kill. She just said that the potato must have lost its strength from being carried too long. Some £10,000 worth of horseflesh died in three

months in this district alone. The total loss must have been enormous. This wastage has been going on at intervals for close on 200 years. How is it to be avoided in the future? Evidently after 190 years nobody knows anything about that. And so I say let us watch and try and find out how the disease starts and how it is transmitted. We don't need scientific instruments for that. We have just to put aside preconceived notions and keep our eyes open and use a little common sense.—Yours, etc.,

P. H. WALKER.

July 12th, 1907.

Lime and Sulphur v. Proprietary Dips.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the June number of your *Journal* appeared a letter written by Mr. S. H. Probart, of Poortje, Aberdeen Road, in which he says that he dipped his sheep four times in Lime and Sulphur without injuring the wool, viz., twice at four months' growth and twice at six months, shorn at eight months, and sold at Port Elizabeth at 6½d. per lb. And that Messrs. Cooper and Nephew valued a sample sent them at 7½d. per lb. They evidently mistook the smell of sulphur for Cooper's Dip.

It is certainly very interesting to hear that Lime and Sulphur does not injure wool, even after four dippings.

But the point that puzzles me is why he dipped four times in what he calls our very best dip. Was it to see what effect it would have on the wool , or had his sheep scab, and if so, why did the first two dippings at four months' growth of wool not cure them?

Most patent cold water dips will cure the scabbiest of sheep in two dippings at four months' growth of wool, if properly done. Odd cases may take three dippings, but not four within so short a period.

Mr. Probart is so pleased at the report he gets from Messrs. Cooper & Nephew and his P.E. agent that he at once recommends making the use of Lime and Sulphur compulsory. To this I certainly object on the ground that there are many parts of the Colony where it is far more economical to use patent cold water dips such as Cooper's and several brands to tobacco extract. Especially where flocks are small and there is a scarcity of feul and no lime. In such parts it would be most unjust to compel people to use so costly a dip.

In the neighbourhood of Aberdeen Road, where the whole country is crusted with lime stone, and there is an abundance of wood, it would perhaps be cheaper to use Lime and Sulphur as only the latter would have to be bought, and even then most farmers would hesitate to dip long wool sheep in it.

The fact that Mr. Probart got 6½d. for his wool is really nothing to go by as wool is unfortunately not always bought on its merits. I know of two clips of wool sent from this district to East London. The one was clean, undipped wool, the other dirty scabby, six times dipped, yet the latter fetched ¾d. per lb more than the former. I have also known a case where one farmer has sorted his wool and got less for it per lb. all round than unsorted wool. But when the time comes that wool is bought on its merits, and I believe it will before very long, the Lime and Sulphur man will be left behind.—Yours, etc.,

ELLIOT FARMER

The Cultivation of Lucerne.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—A great deal of discussion has recently arisen in connection with the best means of cultivating lucerne, and therefore my experience may prove of some benefit to my fellow farmers.

I have a field—heavy black pot clay—which has been cropped by stock for the last five years, and had consequently become very hard indeed. Last year I bought a Martin's Cultivator on condition that it operated satisfactorily.

In July, 1906, I cultivated the lucerne field to a depth of four inches, up and down as well as across, and the result was simply marvellous. I am completely satisfied with the implement, and think that it will be hard to beat.

Owing to the principle of construction it has a "pulverising" as well as a digging

action, which is exactly what is required in the successful cultivation of lucerne. I may also say that it is also a splendid machine for putting in cereals with. Last summer the locusts took my early turnips. I had no time to replough the land, so re-sowed it with barley and put the cultivator over, followed by a light harrow.

The seed came up beautifully and very even, with results all that can be desired. The same applies to a crop of mealies.

The machine also does excellent work among fruit trees, and I consider that no farmer who goes in for orcharding or lucerne can possibly afford to be without a Martin's Cultivator.

I notice that a trial of lucerne cultivators for a £100 prize has been arranged to take place next year, and which I think is a very good move, but at the same time think that the entrance fee, viz., £5 5s. is excessive, and several other conditions are likely to militate against its success. However, the object is a good one, and I shall look forward with great interest to the report of the judges.—Yours, etc.,

JOHN KING.

Rockford, Cathcart, 9th July, 1907.

Experimental Diagnosis of Tuberculosis.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The Paris Academy of Sciences, in its sitting of the 3rd of June, received, through Dr. Roux, of the Pasteur Inst tute, a paper from Mr. Vallée, Professor at the Veterinary College of Maisons Alfort, upon a new process on the "Experimental Diagnosis of Tuberculosis."

In that paper Mr. Vallée recalls that a German learned man, Mr. Von Pirket, had shown that if a scarification was performed on the skin of a tuberculosis man or child, and if the cut part was rubbed with diluted tuberculine, an inflammatory reaction develops itself on the cut parts which may bring about the production of pustules. On the contrary, if the subject is healthy, a slight inflammation of short duration only is noticed. Mr. Vallée has tried on cattle, horses and guinea pigs, if that process would allow the detection of tuberculosis. The results of his experiment were positive.

The method is therefore called upon to render great services in agriculture. Perhaps the principle of the method could be applied also to the diagnosis of other infections. Mr. Vallée has already obtained in that sense, in series of experiments upon various subjects, very gratifying results indeed.—Yours, etc.,

S. M. LEWIN, M.S.A.F.

The Divining Rod again.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—As the divining rod has been brought up for discussion in the *Agricultural Journal* by previous correspondents, I also wish to give my experience with it. Also a suggestion as to the probable cause which makes the divining rod point out flowing streams of water.

I have worked with the divining rod for about six or seven years, and during this time have selected many spots for well-sinking. None of these, so far as I have heard, have been a failure. On this farm two boreholes have been sunk, each yielding over 100,000 gallons per diem, on spots I have pointed out, by means of this magic wand. (For the interest of our mechanical friends, I will say that the one borehole has a 16 ft. windmill, 10 in. x 24 in. in cylinder, working on a 13½ in. stroke erected over it.) On another spot on "Brooklyn" a 3 in. borehole was sunk 129 feet on a place where the rod refused to work, with the result that the hole is to-day as "dry as cork." I am an amateur water finder, and only use the divining rod as such. My theory *re* the cause is (as one of your correspondents has already anticipated) electricity.

My first reason for thinking so is that on insulating myself on glass dishes over a water vein the rod refuses to work. Second is that it only acts for flowing water, which I have proved by standing on the pipe of a dam with the tap closed, the rod in my hand refusing to work until the tap was opened, allowing the water to flow.

Third, the rod must be a green twig, *i.e.*, cut from a live tree, having a certain amount of sap.

Fourth, the same spot can be pointed out by different people. Also any one who works with the rod by fair means will allow himself to be blindfolded and will be able to find the edge of the water vein, to within a foot or so, of the mark he made while selecting with his eyes open.

One difficulty presents itself in the fact that not everybody can use the rod. This may be because of clumsiness in not gripping the rod correctly, so that force may be displayed to its utmost. Or in not holding the rod tight enough to make a complete connection for the electricity to pass through. Undoubtedly there are some people with whom, though the rod be never so correctly held, the divining rod refuses to act. This may be because they are not good mediums for the electrical fluid. I must confess that I am unable to pursue my theory to bed rock, as I have not sufficient knowledge of electricity. But I should like some one with that necessary knowledge to take up the matter, for when once proved it will be the means of removing much prejudice and a consequent saving of much fruitless boring.

I would suggest to anyone taking the matter up that perhaps the giving of an electric shock to a person with whom the rod will not work might enable him to use the rod for a short time. To what depth the divining rod can detect flowing water I have no idea, nor in which direction the water flows, though one can trace water veins for miles. These veins often run parallel with, or on, outside indications. I have noticed while working on bare rock that the edge of a vein is generally on some seam of the rock.

I am quite sure as to the genuine qualities of the divining rod—failures may occur through not being deep enough, or through false work on the part of the man using the rod. On the other hand, water may be struck where the rod fails to indicate it, as the rod only works over running water. Strength of the water may generally be guaged by the width of the vein, though this varies in different formations. The force with which the rod bends may also be taken into consideration; though I believe this has more connection with the speed at which the water flows.

To put my theory in a plainer way, I should say that the electricity is generated by the friction of the flowing water, passes through the earth up into the human body, then the electrical fluid, to complete its circuit, flows through the arms of the one holding the rod along the sap of the forked stick, bending it down towards the earth (the sap of the rod being a better conductor than the air), leaving the end of the rod it returns to the water again. I write having "no axe to grind," except that of benefiting the South African farmer.—Yours, etc.,

FRANK BIGGS.

Brooklyn, Graaff-Reinet, July 16th.

Jersey-Ayrshire Cross.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—For the last six years or more I have been carefully "weeding" out poor milkers from my herd until at the present time I have got a really nice little lot.

I used a pure-bred pedigree Ayrshire bull during that period with excellent results. One day I met an Australian gentleman and mentioned I thought of using a pedigree Jersey Bull in place of the Ayrshire, with the idea of increasing the butter fat in the milk. He strongly advised me not to, as, speaking from intimate knowledge, he assured me it would not lead to satisfactory results, as instanced by the experience of Australian breeders who had tried it and finally rejected it.

I would be glad to hear the opinion of anyone who can speak from experience, as I am by no means satisfied that the use of a Jersey bull would be unsatisfactory.—Yours, etc.,

PERSEVERE.

Dwaal, July 15th.

Drainage in Orchards.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I note in *Farm and Veld*, and also Mr. C. T. Vermeulen, of Prieska, writes *re* "Failure of Peaches, Etc.," also Mr. A. G. Du Toit, of Keimoes.

I have 200 peach and other trees two years old. So far they appear all right, but it seems to me, after reading the notes above referred to, that they are getting too much water in winter.

These trees are planted in ground facing east,, with a slope of about 1 in 40 feet. There is a soakage from the mountains in winter if it has been a wet season, and the water rises in July to within 4 feet of the top of the well. I have put in drains at about 40 feet apart, with stone in, and covered in again, but the stones are only about 6 inches high in drain. I have ploughed very deep the whole of the land. I now find if I dig down 2 feet at the bottom end of the garden I get running water, but on the top end it is 5 feet to water. The whole of the land is damp to within an inch of the top, the sub-soil is sandy, lime-looking ground (but I do not think it is lime), stones and sandy pot clay 8 feet down for the most part. The stony ground 8 feet down takes the water away, with a layer of drift sand at about same depth. It is only in July that the water rises to such a height, gradually going down in the well to 18 feet in a dry season, but for the most part of the year about 14 feet deep down in the well. I have cut down to one of the drains and find water running in it at 3 feet underground. My trees have, with few exceptions, not shed their leaves yet, the grafted trees being the only ones having done so. I have taken out one tree three years old to see, and I find two or three thick roots are in the watery ground and drift sand, the smaller and rootlets being a foot and two feet underground in the manure dug in, but spread from the trunk of the tree 3 and 4 feet all round.

Do you advise me to make more drains and deeper; or will the water within 4 feet of the top not hurt for six weeks in the winter (but not every winter)? The trees are growing exceptionally well, having in some cases made 5 and 6 feet of wood from November till May. Apricots, peaches and Japanese plums are in the garden, but I only notice that the leaves are not shed from the seedling peaches.—Yours, etc.,

JOHN LANGDON.

Oliphants Hoek, Kuruman.

In this case the natural drainage would seem to be formed by the stony seam and drift sand above the 8 feet level. It would be advisable, therefore, to try to keep the feeding roots of the trees above this level if possible. This is done in some orchards by judicious surface irrigation. The drains might be deepened and enlarged so as to carry off more water if the yellowing and leaf-shedding continues and becomes more marked. The pot clay at 8 feet is not encouraging, and ultimately may cause trouble when there is so much water in the soil unless it is kept well drained.

Teats injured by Spraying—Suspended Fertility in Rams.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Some three months ago I sprayed some cows that were badly infested with ticks with paraffin and water in the proportions of 25 per cent. paraffin and 75 per cent water. A week after the spraying the cows' teats commenced to get sore, and in a few days they were practically raw and in a very bad state indeed. It took them more than a month to get well. Would dipping cows in tanks in the ordinary cattle dips as arsenite of soda or McDougall's have any bad effects on the teats?

It it necessary to make the dip weaker for calves a month or two old than for grown cattle?

What is the reason that a ram is generally infertile if put to ewes just after clipping. In Griqualand East it is mostly understood that it is safest to keep any rams that have just been clipped away from ewes for ten or twelve days. I put a ram to eighty ewes on the 23rd December last. He had then been clipped thirteen days. He commenced tupping as soon as he was put in, and did on the average three to four ewes a day, and kept on about the same for two months. (He was shedded and well fed every night.) There was not a lamb from the ewes before the 25th June. Since then just odd ones have come on, until a few days ago, when they started coming at the rate of three or four a day; and judging by the look of the ewes there will be about forty lambs in the next fortnight. In this case the ram must have tupped for for five weeks without putting a single ewe in lamb, though he had been kept away from them for thirteen days after being clipped.—Yours, etc.,

P. E. LEONARD.

Glen Dower, Kokstad, July 14th.

One possible cause of the injury to the teats of the cows mentioned above was that the paraffin and water were not thoroughly mixed, and some pure paraffin got on the teats, setting up irritation. The sores may also have been the after effects of ticks. As regards the rams mentioned, it is well-known that it is not advisable to put such

animals to stud within about a fortnight of being shorn. But in this case it is claimed that the animal was rendered temporarily infertile for about a month after shearing, and then recovered his powers, which seems to add a complication. Perhaps some of our readers with practical experience who have studied the question may be able to offer some information.

"Brak" in an Orchard.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Kindly permit me a small space in your esteemed *Journal*. I see that Mr. A. P. du Toit, of Keimoes, inquires about the dying of his fruit-trees growing in brackish soil. Brack is undoubtedly the cause of this, and the best plan to stop the trouble would be to cover the ground with a thick layer of the pods of beans and peas, and ploughing them in to a good depth. This will supply the necessary plant food for the trees. Dig the holes with a radius of about 3 feet and about 2½ or 3 feet deep; place the mixed earth and pods in the hole and plant the tree in it. Brackish ground being poor in the elements required by the roots of trees for their growth, the pods will increase the moisture in the soil sufficiently to bring plant food to the roots. A good plan is to spread a layer of pods, 3 to 4 inches deep, on the ground, then to sow peas in order to get enough pods to be ploughed in during the next season. I speak from experience. My father had a piece of land which was totally useless for the production of any crop whatsoever, and after treating it twice in the manner described above, it was the finest and best land for the cultivation of tobacco. Thanking you in anticipation,—Yours etc.,

M. v. Z.

Withoek, P.O., Venterstad, 11th July, 1907.

Water Drills and Water Boring.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I get very little time for correspondence or I would sooner have taken notice of Mr. Huddy's letter on the above subject, which appeared in your number for June last. Being a contractor, Mr. Huddy naturally writes from a purely partisan point of view in support of a business in which he is engaged. His entire letter, however, is childish, and does not affect my contention that the Percussion Drill is practically a worthless implement for the development of underground waters. I am quite aware of the fact that the Government will bore for water with Diamond Drills, if required, and I am also aware of the fact that for some time past the Government has been calling in the Diamond Drills and favouring Percussion Drills. The reason of this is, not that the Diamond Drills are in any way inferior to Percussion Drills, but that the latter are cheaper, and that the Diamond Drills at present in the possession of the Government are of too small a diameter. Mr. Huddy states that farmers prefer the superior six-inch holes made by the Percussion Drills to the 3⅛-inch holes made by Diamond Drills. By this statement he wishes people to believe that Diamond Drills are incapable of boring larger diameters than that, which, of course, is nonsense. He goes on to say that for boring to enormous depths to strike artesian waters the Percussion Drills will be best. As everyone knows that the Percussion Drills are incapable of boring in hard formations, this statement is merely assertion and not founded on fact. Mr. Huddy carefully avoids the question of hard formations, for he knows perfectly well that the drills are incapable of piercing rock, and that contractors won't undertake to bore in rock. As it is impossible to go "enormous depths" without striking rock, how can the Percussion Drill be best for this purpose?

I have no doubt that some farmers who have been fortunate enough to strike strong water in soft formation have been pleased with the work done by the Percussion Drill. But how about the thousands who have failed to do so, and because this drill could not pierce rock? We hear a lot about the farms where water has been struck, but nothing about those where nothing has been struck. The Percussion Drills have been withdrawn from the Hay and Barkly districts, so I am told, because the formation is too hard for them to work in, *not* because underground water does

not exist. This fact would not show that Percussion Drills are the best. I would ask Mr. Huddy to read a letter in your *Journal* of the current month by Mr. C. J. Luteman-Johnson, of Penrock, Grahamstown, and ask him if he thinks this gentleman was satisfied with the work of the Jumper Drill?

On this subject it would be interesting if, during the present session of Parliament, one of our members would ask for returns showing the amount spent in water boring in this country. Also for the number of holes in which *valuable* supplies of water have been struck, and showing, taking the entire expenditure, what the successful boreholes have cost the country per foot of boring. Further, how many holes have been failures, and from what cause.—Yours, etc.,

W. H. WAYLAND.

Fort Richmond, 25th July, 1907.

Mr. Fehr's Blight-Proofing Offer.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Very respectfully I would submit to you the question whether the letter of Mr. H. Fehr, entitled "Apples made Blight Proof," in your last issue, is exactly the sort of thing expected in your columns. We look to the *Agricultural Journal* for scientific advice, that is, to tell us what to do in this or that case and the reasons for it. We are not satisfied with mere tips. But here we have an offer to make our apple trees blight proof at fourpence a-piece, without one word to indicate the way their immunity is secured. Clearly this is an advertisement of a secret process, not of a scientific procedure, and therefore cannot commend itself to the judgment of anyone who is personally unacquainted with Mr. Fehr and his trustworthiness.

Already we all of us know that, just as the phylloxera is prevented from attacking vine-roots by grafting on American stocks, so the subterranean apple-blight is kept at bay by grafting on the sorts known as *Northern Spy* and *Winter Majetin*. The whole scheme was clearly explained in the little sixpenny orchard-book published by your Department as long ago as 1896. The aerial stage of the insect is obviously open to destruction by spraying. You must buy your spray-pump, mix your paraffine-emulsion, and go to work. Thus comes the end of both forms of apple-blight.

I am tempted to report the wisdom of a local grower not far from here, who, having lived long, believes himself to know everything. He could tell us how to make the apple trees blight-proof, of course. You had to get a small gimlet-augur, bore a hole slanting downwards into the living substance of the trunk, pour in some good strong Cooper's Dip, and plug the hole with clay. He'd warrant the blight to clear off in a fortnight. We answered him according to his wisdom, gravely assured him that the cure was a very likely one, and that in our parts we treated obstinate cattle diseases much the same way; that is, we made a hole in the animal in some handy place, and poured in a good lot of the same celebrated panacea. It is well to cap a story properly; makes people think.—Yours, etc.,

R. LONGMORE.

Biesjes Fontein.

It is obviously impossible to say whether there is or is not any foundation for Mr. Fehr's statements, so the letter was published in order to give the opportunity of trials being made. The risk is so slight—a paltry fourpence pays all costs—that there is obviously very little in the shape of advertisement about the matter until the theory is demonstrated. If Mr. Fehr *can* render apple trees blight-proof he is a public benefactor, even though he asks the modest sum mentioned. There are so many theories abroad on this subject which fail with such monotonous regularity on trial, that the sooner they are all exhausted the sooner will people realise their utter worthlessness and stick to recognised methods. And we must ask our readers to always bear in mind that opinions expressed by correspondents are their own. In this case it is merely the airing of a theory, and a little publicity is frequently better than ridicule or suppression in such matters. It serves quite as useful a purpose and generally leads to better understandings.

RURAL REPORTS.

Adelaide, July 22.—Weather very dry and cold, with heavy frosts nightly. Veld continues good. Mealies an indifferent crop. Stock in good condition. Dairying has fallen off, as the local dairy company is in liquidation, which will be a great drawback to farmers who wish to sell their cream. Slaughter stock plentiful. Horses kept in fair condition, but a disease is reported to have broken out among them in the Mancazana ward. Ostriches doing well, and beginning to breed. Fruit should be plentiful this year if the frost does not kill the buds, which are already opening on peach trees.

Bedford, July 29.—Frosty nights, but unusually calm, bright days are prevailing, usual winds conspicuous by their absence. Large stock are doing well, the cows are beginning to calve for the new season, which seems promising. Dairying good for the time of year; slaughter stock plentiful. Sheep are in good order, with the exception of some of the young lambs, which are suffering from tapeworm. The grass is too long for sheep now that it is dry from the frosts. Slaughter stock plentiful; goats are also doing well, the kidding season having started promisingly. Ostriches generally laying well and in good condition.

Clanwilliam, July 20.—Frosts and dry weather prevail, but the conditions of the veld is good considering the weather. The prospects of cereals are not very promising, owing to severe east winds and drought. All stock generally in fairly good condition.

East London, July 6.—Weather windy and cold, with intervening bright days; rain needed. Such cereals as are sown are looking well; no rust yet. In fruit, oranges and guavas are plentiful and cheap. Stock generally is doing fairly well, but pigs are scarce.

Fort Beaufort, July 11.—Weather very cold and frosty at nights. Large stock and Angoras doing very well, but sheep are not doing so well, owing to the prevalence of wireworm.

Hay, July 13.—Weather very dry and cold. The veld, however, remains in good condition, and the young cereals look promising. Stock of all descriptions doing fairly well.

Herschel, July 18.—Weather dry, with heavy frosts at night. Veld very bad, not yet recovered from locusts. Fruit doing well. Cereals not sown yet for fear of locusts. Stock all round keeping in fairly good condition.

King William's Town, July 5.—Weather cold, with light showers in some parts. Veld good for the time of year. Stock generally in fair condition.

Ladismith, July 10.—Weather fine, but very dry. Stock generally doing well.

Malmesbury, July 13.—Weather dry, with very cold easterly winds. The veld was in good condition from previous rains, but is now going off again. Cereals are doing well so far, and stock generally is doing well.

Middelburg, July 9.—Weather calm, but dry, with heavy frosts. Veld still good. Large quantities of wheat are being sown, and ploughing is still proceeding. Oats not sown much this season. Stock generally in good condition, and the lambing season is turning out well.

Oudtshoorn, July 12.—Weather very dry and cold, with high winds. Veld good for the time of year. Cereals are just being sown. Stock doing fairly well. Ostriches are also doing well, and pluckings are very promising, but "Vrotmaag" is causing some losses.

Peddie, July 10.—Weather dry and very cold; veld fairly good. Young oat crops looking well. Ostriches nesting, with a prospect of a good season. General conditions good.

Prieska, July 16.—Weather dry and cold; veld very good. What cereals have been sown are looking well. Stock of all kinds in fairly good condition.

Queenstown, July 2.—Clear bright days, with cold frosty nights. Veld good where the locusts have not damaged it. Cereals not much sown yet, owing to the locusts being still about. Stock doing very well all round.

Steynsburg, July 16.—Weather dry, with warm days and cold nights; veld good for the time of year. Cereals and lucerne are looking fairly well, and stock of all descriptions is keeping in good condition.

Sutherland, July 27.—Weather fine and cold; the veld is in good condition—in fact, it is many years since it has been so good. Large quantities of wheat are sown in some parts of the district, but not so much oats. Stock and ostriches are still doing well all round.

THE TRANSKEI.

Cofimvaba, July 1.—A few showers of rain have fallen which freshened up the pasturage, and all stock is in as good condition as could be expected at this time of the year. The mealies and Kafir corn crops have now been reaped; unfortunately, the former was rather poor in many parts of the district. The work of inoculating for lung-sickness has been commenced, and the natives are evincing a keen interest in the work.

Flagstaff, July 1.—Weather seasonable; veld poor. Good crops of mealies and Kafir corn have been reaped, but the grain is poor. All stock in fairly good condition and healthy.

Nqmakwe, July 4.—The natives have practically finished harvesting their lands. Owing to the heavy and frequent rains and mists of last summer and autumn, the yield of mealies is not so great as was anticipated at the beginning of the season; but the crop is, notwithstanding, a good one, and mealies and Kafir corn are plentiful. The inoculation of cattle is proceeding apace in consequence of the prohibition of any but inoculated cattle crossing the Kei into the Colony proper. Locusts have appeared, but not in great numbers.

Tabankulu, July 1.—Weather during June favourable for harvesting. More frost has occurred than usual, but stock has not suffered. Lung-sickness has broken out in several centres, and has been invariably introduced by cattle used in transport to the Colony.

NOTES ON THE WEATHER OF JUNE, 1907.

By CHARLES M. STEWART, B.Sc., Secretary to the Meteorological Commission.

Unusually high mean pressure, a practically normal mean temperature, with cool days and warm nights, exceptionally bright and clear sunny days in the West and East, but cloudy mornings in the South and interior, a few thunderstorms, frequent fogs towards the middle of the month, frosts general over the interior, but less severe than usual, winds mostly light, occasional hot winds, slight local falls of sleet and snow, and a mean depth of rainfall less than half the usual, were the leading features of the weather of June.

DIVISION.	Mean Rainfall (1907).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	2·32	9	5·84	13	−3·52	−60
South-West ...	1·30	5	3·48	8	−2·18	−63
West Coast ...	0·41	2	1·44	6	−1·03	−72
South Coast ...	0·88	6	2·18	6	−1·30	−60
Southern Karoo ...	0·81	3	0·90	3	−0·09	−10
West Central Karoo ..	0·42	2	0·54	2	−0·12	−22
East Central Karoo ...	0·33	1	0·42	2	−0·09	−21
Northern Karoo ...	0·25	1	0·62	2	−0·37	−60
Northern Border ...	0·11	2	0·42	1	−0·31	−74
South-East ...	0·37	3	1·03	3	−0·66	−64
North-East ...	0·14	2	0·88	3	−0·74	−84
Kaffraria ...	0·23	1	0·79	2	−0·56	−71
Basutoland ...	0·11	1	0·98	2	−0·87	−89
Orange River Colony ..	0·00	0	0·70	2	−0·70	−100
Durban (Natal) ...	0·34	3	0·94	...	−0·60	−64
Bechuanaland ...	0·00	0	0·39	1	−0·39	−100
Rhodesia ...	0·18	3	0·14	1	+0·04	+29

Precipitation.—The mean rainfall, as shown by the records from 336 stations, was only 0·62 ins. falling on 3 days, being 0·88 ins., or 59 per cent. below the average. The mean divisional rainfall, as shown by the accompanying table, was below the average by amounts ranging from 10 per cent. over the Southern Karoo to a state of absolute drought in the Orange River Colony and Bechuanaland. The only exception to this statement was Rhodesia, where there was a slight excess amounting to 29 per cent. Generally speaking, there was a deficit of 60·80 per cent. Analysing the returns from the 336 stations, it is found that 43 had no rainfall, but that 221, or two-thirds of the total, had small amounts of between 0·01 in.; 47 had 1·01—2 ins.; 18 had 2·01—3 ins.; 5 had 3·01—4 ins., the remaining two (2) being St. Michael's (Table Mountain), with 4·85 ins., and Waai Kopje with 4·18 ins. Amounts exceeding three inches were confined entirely to stations in the Cape Peninsula, while 2·3 ins. were registered also at a few places in the South-West, the South Coast, and at one station in the South-East. In fact the only divisions with means exceeding one inch were the South-West with 1·30 ins., and the Cape Peninsula with 2·32 ins. It naturally follows that with such small totals the intensity of fall could not be anywhere very great, so that it is not surprising to find that of 329 stations only five had maximum amounts recorded in 24 hours of 1·01—2 ins.; these were Newlands, with 1·39 ins. on the 2nd; Matjesfontein,

with 1·37 ins., on the 10th; Devil's Peak (Blockhouse), 1·3—3 ins. on the 2nd; Wellington and Cape St. Francis, with 1·16 ins., both on the 1st. As 43 had "nil" and 281 had 0·01—1 in. for their maximum daily intensity, the unusually large proportion of 98·5 per cent. had such small maximums. *Thunderstorms* were reported from 44 stations on 8 days, principally the 9th and 10th, those on the other dates being practically isolated instances of such storms. *Hail* was noted at 6 stations on 4 days, viz., 1st, 10th, 11th, and 20th. *Snow* fell at 7 stations on 4 days, viz., Carnarvon Farm, Dordrecht, Molteno, and Hogsback on the 1st; Uniondale on the 4th; and Hogsback on the 28th and 29th, but the amounts were usually small and alternated with rain or sleet, so that the snow did not lie on the ground. The Drakensberg were still snow-capped at the end of the month. *Sleet* occurred at 13 stations on 10 days, principally the 1st.

Temperature, Cloud and Wind.—The mean temperature of the month (52·7°) was only 0·1° warmer than usual, but 1·7° colder than in May last. The mean day temperatures (63·6°) were 0·7° lower, but the mean night temperatures were 0·9° higher than the normal, thus reducing the mean daily range to 21·8°. Speaking generally, the days were warmer than usual in the West and South-West, and over the more northerly and inland parts of the Colony, the greatest excess being 4·6° at O'okiep. Over the Cape Peninsula, the mean maximum slightly under the average at the lower stations. The days were colder than usual along the South Coast, over the South-East and part of the North-East, as well as in Kaffraria, Basutoland, and at Hopefountain by 1—4 degrees. The maximum temperatures were above the average in Basutoland, parts of the Karoo, Northern Border, the South-West, the South Coast and the Cape Peninsula, being apparently largely affected by local physical conditions, whilst at other stations the nights were colder than usual by varying amounts, the deficits being mostly 1·5° to 2°. Over the Cape Peninsula, as shown by the Royal Observatory records, unusually cold weather prevailed from the 1st to the 5th, on the 13th to 15th and 27th, 28th and 30th, the remaining days having mean temperatures considerably in excess of the average. The days were warmer than usual on the 7th and 8th, from 18th to 22nd, and on the 29th, particularly on the 8th and 22nd, when the maximums recorded were 10·5° and 12·6° F., respectively higher than the average. On the other hand, the night temperatures were commonly considerably lower than usual from the 1st to the 8th, 13th to 15th, on the 17th, and from the 21st to the end of the month, heavy dew being deposited practically every morning of the month. The mean warmest station was Port St. John's, with a temperature of 61·2°, and the mean coldest, Mayein (Basutoland), with 42·0°, a difference of 19·2°. The highest mean maximum was 70·9° at Port St. John's, and the lowest mean minimum 28·4° at Leribe. The warmest days were most commonly those of the 8th, 23rd and 25th, although maximum temperatures were recorded at different stations on twelve other days, principally in the latter half of the month. Minimum temperatures were most numerously recorded on the 6th, 7th, 29th and 30th, but also on other eleven (11) mornings chiefly from the 2nd to the 9th, and 15th to 17th. The mean of the highest temperature readings was 74·8° and of the lowest 33·3°, a fall of only 1·1° and 1·6° as compared with the corresponding values for May; and showing a mean monthly range of 41·5° as against 41·0° in the previous month. The absolute maximum for this month was 83·0° registered at Umtata on the 15th and 25th, and the absolute minimum 20·0° at Hanover on the 29th, yielding an extreme monthly range of 63°. *Frosts* were of daily occurrence, 485 instances being reported during the month. They were most numerous from the 1st to the 10th, and from the 19th to the end of the month, but more particularly from the 2nd to the 7th, and on the 29th and 30th. Judging from the reports received, it would appear that these frosts were much less severe than is usually the case during the month of June, being most intense during the first week.

These typical anticyclonic conditions (the mean barometric pressure at the Royal Observatory was 0·047 ins. above the average) were accompanied by a low mean percentage of *Cloud* (38 per cent.). In the West and South-West the mean amount of obscuration was mostly about 20 per cent. less than usual, as well as over parts of the North-East and Kaffraria. On the other hand the morning skies were much cloudier than usual along the South Coast, in the South-East and over the interior, mostly by about 10 per cent. The cloudiest station was Cape Agulhas, with 62 per cent., and the clearest skies were experienced at Tabankulu, with 11 per cent. One of the most noteworthy features was the unusually uniform distribution of cloud, being mostly between 35 and 40 per cent. at the greater number of stations, the proportion being greatest along the South Coast and least in Kaffraria. The number of *Fogs* reported was considerably in excess of those noted during May, 134 instances being noted on 28 days of the month, most widely from the 17th to the 20th. The only dates on which these were not reported were the 7th and 26th. Similarly light *Winds* and frequent calms accompanied the unusually high pressure, the mean *Wind Force* on the Beaufort Scale being 1·53, corresponding to a mean velocity at 8.30 a.m. of 10·6 miles per hour. The prevailing direction of these morning winds was between E. and S. in the West and South-West, but Westerly along the Coasts and inland, except at Kim-

berley, where it was North-Easterly. and Kenhardt, Aliwal North, and Hopefountain, where it was South-Easterly. The Royal Observatory record for this month shows an excess of winds from South, E.S.E., S.E., and N.N.E., but a marked decrease in all winds having a Westerly component. The mean wind force there was only 0·90, corresponding to a velocity of 7·5 m. per hour, which is 2·3 m. per hour less than usual. *Gales* were somewhat more numerous than in May, being noted as occurring at 22 stations on 14 days, particularly the 28th. *Hot Winds* were also more frequent than usual, being reported from 16 stations on 6 days, particularly the 8th, 9th, and 22nd. Three (3) *Duststorms* occurred during the month on an equal number of days.

A slight *Earthquake Shock* was experienced at Kokstad at 11.20 p.m. on the 11th.

OBSERVERS' NOTES.

VRUCHTBAAR.—After the heavy rainfall of last month, all cereal crops have come on beautifully this month with the fine warm days.

UITENHAGE PARK.—The rainfall for the month—0·08 inches—is the smallest since April, 1904.

THEEFONTEIN.—Sharp frosts from 1st to 9th, when a succession of unusually warm days followed, continuing up to the 27th, with only slight frosts at night. Winds very light and variable.

THE MEADOWS —This month has been very mild, with the exception of the first week, which was very cold, with severe frosts.

VICTORIA WEST.—Weather during the month has been intensely cold, heavy frosts every night, or very cold, biting winds blowing.

WAVERLEY.—Perfect weather all this month, only one unpleasant day.

CARNARVON FARM.—The rainfall for the month (0·11 inches) is the lowest for June since 1900, with the exception of 1904, when 0·10 inches was recorded, the highest fall being 1902, when we had 2·14 inches. *Frosts* only 19; this is the lowest for the last 7 years, with the exception of 1905, when we had 16, and 1906 also 19. The last half of the month only 5 frosts were recorded. This is quite a record for June, being extremely mild for 14 consecutive days. *Wind*, a bit below the average, and of these only three fierce gales, balance more or less moderate and not cold. The dry weather and absence of cold winds have materially saved the condition of stock this month. *Cloudless Days*, six. There were 36 cloudless days for June during the last seven years, so this is a little below the average. *General Prospects*: Locusts about here, as I stated in my last month's report, copulated, and were filled with eggs, but I have seen shoals dead and all females full of matured eggs—something rotten in the State of Denmark. Let us hope that the mountains have *this* time "laboured and brought forth a mouse." Stock in fairly good condition; should be small losses this winter; a large quantity of ploughing done, and prospects not bad. Vast crops of mealies reaped—I say vast in comparison to the punty crops of the past. Four shillings per 100 lbs. best offer, which is ruinous to growers.

LAURISTON.—Cold frosty nights, but lovely days for the whole month. Drakensberg still capped with snow.

KOKSTAD.—Severe frosts, with cold, biting easterly winds. Light fall of snow on the hills on the 28th inst. Good crops of mealies this year.

GROOT DRAKENSTEIN.—Mean temperature exactly normal. Rainfall 3·74 inches below average (14 years), viz., 6·54 inches. Rainfall for six months (January-June), 20·06 inches is 2·48 inches above average. A period of almost absolute calm prevailed for 21 days, from 7th to 27th, for the most part with clear weather, though morning mists were fairly frequent.

KOKSTAD (The Willows).—Barometrical pressure higher than usual. Severe and continuous frosts have done considerable damage to young trees. The monthly mean temperature lower than yet recorded for June. No rain fell during the month. A slight rumble of earthquake was heard on the night of the 11th.

TEMPERATURE, JUNE, 1907.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	62·1	46·9	54·5	75·1	8	38·9	7 & 13
Cape Town (Hospital) ..	61·8	48·1	55·0	76·0	8	42·0	30
Cape Town (S.A. College) .	63·6	46·6	55·1	75·0	22	41·4	7
Simonstown ..	65·1	51·2	58·2	78·1	8	48·0	30
Blaauwberg ...	60·7	47·6	54·2	76·5	8	44·0	15
Sea Point ...	61·9	49·1	55·5	77·0	8	44·2	7
Devil's Peak ..	59·8	46·1	53·0	71·0	8	40·0	5
Table Mountain (Disa Head)	56·3	44·1	50·2	65·0	19 & 22	37·5	5
Wynberg ...	63·1	46·4	54·8	75·0	8	41·5	7
Groot Drakenstein ...	65·5	43·0	54·2	77·1	8	36·5	7
Robertson (Plantation) .	64·7	40·5	52·6	75·5	8	30·0	6
Danger Point ..	59·7	50·4	55·0	65·0	23	42·0	17
Wellington (Hug. College) ..	64·1	47·9	56·0	70·3	8	39·9	7
Elsenburg (Agri. College) ..	62·7	42·3	52·5	75·1	22	33·5	6
O'okiep ...	68·4	42·5	55·4	78·2	27	33·0	2
Van Staaden's River ..	65·6	44·4	55·0	78·0	23	34·0	4
Cape Agulhas ...	59·9	50·6	55·2	69·0	8	43·0	4
Heidelberg ..	63·2	42·4	52·8	74·0	8	32·0	29
Cape St. Francis ...	64·3	48·8	56·6	81·0	23	42·0	7
Concordia (Plantation) ...	60·7	48·8	54·8	80·0	23	42·0	6
Storm's River ..	64·7	44·9	54·8	78·0	23	36·0	30
Uitenhage ...	67·0	40·9	54·0	80·7	23	30·0	30
Mossel Bay ..	63·2	48·4	55·8	78·0	22	40·0	29
George (Plantation) ..	63·5	46·3	54·9	78·0	23	39·5	30
Emerald Hill, P.E. ...	63·3	52·5	57·9	71·0	4 & 14	41·0	30
Port Elizabeth ...	66·0	49·8	57·9	81·0	23	41·0	30
Amalienstein ...	65·1	35·8	50·4	79·0	23	27·0	30
Hanover ..	61·0	28·5	44·8	67·0	15, 16 & 17	20·0	29
Murraysburg ...	61·3	32·4	46·8	69·0	15 & 25	21·0	5, 6 & 28
Kimberley ...	67·6	36·8	52·2	77·0	25	25·9	2
Kenhardt ...	70·3	37·9	54·1	80·0	25	27·0	2 & 5
King William's Town ...	68·0	40·4	54·2	80·0	23	31·0	29
East London ..	69·2	49·3	59·2	80·0	3	41·0	8
Sydney's Hope ..	62·5	46·3	54·4	72·5	23	37·0	6
Bedford ..	65·0	40·7	52·8	78·0	26	29·0	6
Queenstown ...	64·1	35·1	49·6	75·0	25	22·0	6 & 7
Aliwal Noord ...	64·5	29·5	47·0	73·5	14	20·5	30
Rietfontein (Aliwal North) .	57.9	31·1	44·5	66·1	15	22·1	2
Port St. John's ..	70·9	51·4	61·2	82·0	26	46·0	4 & 9
Main ...	65·3	40·8	53·0	77·1	25	27·5	30
Tabankulu ...	64·9	39·7	52·3	76·8	25	29·8	6
Umtata ...	68·9	34·8	51·9	83·0	15 & 25	26·0	6 & 7
Kokstad (The Willows) ...	63·7	31·6	47·6	72·1	25	21·0	8
Moyeni	55·1	28·8	42·0	64·0	27	21·0	29
Teyateyaneng ...	59·4	29·9	44·6	66·0	17	25·0	29
Mohalie's Hoek ...	59·7	29·8	44·8	68·0	16 & 17	21·0	29
Leribe ..	59·6	28·4	44·0	67·2	15	20·5	3
Kuruman ..	62·2	34·0	48·1	75·4	29	21·0	2
Hope Fountain ...	67·1	43·4	55·2	70·7	1	37·5	16
Means ..	63·6	41·8	52·7	74·8	...	33·3	...
Extremes ...	...	...	...	83·0	15 & 25	20·0	29

RAINFALL, JUNE, 1907.

I. CAPE PENINSULA:

Station	INS.
Royal Observatory (*a*) 12 in gauge	2·01
Cape Town, Fire Station	1·79
Do. South African College	2·21
Do. Molteno Reservoir	2·10
Do. Platteklip	2·52
Do. Signal Hill	1·42
Do Hospital	1·63
Sea Point, The Hall	1·60
Do. Attridge	1·67
Camp's Bay	1·30
Table Mountain Disa Head	2·20
Do. Kasteel Poort	3·76
Do. Waai Kopje	4·18
Do. St. Michael's	4·85
Devil's Peak Blockhouse	3·43
Do. Nursery	2·68
Do. Lower Gauge	
Woodstock, The Hall	2·68
Do. Municipal Quarry	3·00
Do. do. Nipher's Shield	3·22
Newlands, Montebello	3·75
Claremont, Carrigeen	
Bishopscourt	2·37
Kenilworth	1·66
Wynberg, St. Mary's	1·63
Groot Constantia	1·83
Tokai Plantation	2·21
Plumstead, Culmwood	1·15
Muizenburg (St. Res.)	
Fish Hoek	
Simon's Town, Wood	1·72
Do. Gaol	1·41
Cape Point	
Blaauwberg Strand	1·39
Robben Island	
Durbanville	
Maitland Cemetery	2·08
Tamboer's Kloof	1·97
Woodhead Tunnel	3·04
Lower Reservoir, Table Mountain	2·25

II. SOUTH-WEST:

Station	INS.
Eerste River	1·74
Klapmuts	1·48
Stellenbosch, Gaol	1·90
Somerset West	1·51
Paarl	1·81
Wellington, Gaol	2·30
Do. Huguenot Seminary	1·30
Groot Drakenstein, Weltevreden	2·80
Porterville Road	0·84
Tulbagh	0·89
Ceres Road	
Kluitjes Kraal	
Ceres	2·01
The Oaks	
Rawsonville	0·99
Caledon	1·34
Worcester, Gaol	0·35
Do. Meiring	
Do Station	
Hex River	0·55
De Doorns	

II. SOUTH-WEST (*con.*):

Station	INS.
Karnmelks Rivier	1·24
Lady Grey, Division Robertson	
Robertson, Gaol	0·56
Do. Govt. Plantation	0·42
De Hoop	1·17
Montagu	0·99
Danger Point	1·59
Vygebooms River	
Elgin Plantation	
Elsenburg Agricultural College	1·48
Berg River Hoek	
Wemmer's Hoek	
Roskeen	1·66
Vruchtbaar	1·38

III. WEST COAST:

Station	INS.
Port Nolloth	
Do. Lieut. Barber	
Anenous	0·00
Klipfontein	0·31
Kraaifontein	0·19
O'okiep	0·00
Springbokfontein	0·00
Concordia	
Do. Kraphol	0·00
Garies	
Lilyfontein	0·03
Van Rhyn's Dorp	0·17
Clanwilliam, Gaol	0·00
Do. Downes	
Dassen Island	1·10
Kersefontein	
The Towers	1·26
Abbotsdale	
Malmesbury	0·88
Piquetberg	1·36
Zoutpan	
Wupperthal	
Welbedacht	

IV. SOUTH COAST.

Station	INS.
Cape Agulhas	1·06
Bredasdorp	0·90
Swellendam	1·04
Potberg	
Zuurbrak	1·79
Grootvaders Bosch	
Heidelberg	0·58
Riversdale	0·60
Melkhoutfontein	
Vogel Vlei	0·60
Geelbek's Vlei	
Mossel Bay	0·50
Great Brak River	0·51
George	0·80
Do. Plantation	0·70
Do. Woodifield	
Ezeljagt	0·39
Millwood	0·92
Sourflats	0·81
Concordia	1·08

IV. SOUTH COAST (*con.*):

	INS.
Knysna	0·28
Buffel's Nek	1·96
Plettenberg Bay	
Harkerville	
Forest Hall	
Blaauwkrantz	1·36
Lottering	2·37
Storm's River	2·43
Witte Els Bosch	1·74
Humansdorp	0·91
Cape St. Francois	1·63
Hankey	0·33
Witteklip, Sunnyside	
Van Staden's, Intake	0·35
Do. On Hill	0·20
Kruis River	
Uitenhage, Gaol	0·14
Do. Park	0·08
Do. Inggs	0·08
Armadale, Blue Cliff	0·00
Dunbrody	
Port Elizabeth, Harbour	0·62
Do. Victoria Park	
Do. Walmer Heights	1·70
Shark's River, Nursery	
Do. Convict Station	0·80
Tankatara	
Centlivres	

V. SOUTHERN KAROO:

Verkeerde Vlei	
Bok Rivier	
Triangle	
Touws River	
Do. D.E. Office	
Pietermeintjes	
Grootfontein	
Ladismith	1·00
Amalienstein	0·88
Seven Weeks' Poort	
Calitzdorp	
Oudtshoorn	1·00
Vlaakte Plaats	
Uniondale	0·90
Kleinpoort	
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

Matjesfontein	
Laingsburg	
Prince Albert Road	
Fraserburg Road	0·12
Prince Albert	1·23
Zwartberg Pass	
Booi's Kraal, Beaufort West	
Beaufort West, Gaol	0·24
Dunedin	
Nel's Poort	0·11
Camfers Kraal	0·14
Lower Nel's Poort	
Krom River	
Baaken's Rug	0·07
Willowmore	0·23
Rietfontein	
Steytlerville	0·25
Boois Kraal, Beaufort West	

VII. EAST-CENTRAL KAROO:

	INS.
Buffels Kloof	0·34
Aberdeen, Gaol	
Do. Bedford	0·14
Corndale	
Aberdeen Road	
Klipplaat	
Winterhoek	
Klipdrift	
Kendrew. Holmes	
Do	
Graaff-Reinet, Gaol	0·52
Do. Eng. Yard	0·52
Do. College	
New Bethesda	0·20
Roodebloem	
Glen Harry	0·37
Wellwood	0·44
Do. Mountain	0·46
Bloemhof	0·36
Jansenville	0·07
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	
Toegedacht	
Klipfontein	
Cranemere	
Pearston	0·30
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek	
Middlewater	0·10
Somerset East, Gaol	0·31
Do. Do. College	
Longhope	
Cookhouse	
Middleton	
Spitzkop, Graaff-Reinet	0·49
Bruintjes Hoogte	1·86
Grobbelaars Kraal	0·43

VIII. NORTHERN KAROO:

Calvinia	0·52
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	1·25
Fraserburg	0·16
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	0·47
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·21
Victoria West	0·51
Omdraais Vlei	
Doornkuilen	0.00
Britstown	0·00
Wildebeestkooij	
Murraysburg	0·50
De Kruis, Murraysburg	0·48
Richmond	0·08
De Aar	
Middlemount	
Hanover	0·21
Theefontein	0·27

VIII. NORTHERN KAROO (*con.*):	INS.
Zwagersfontein	
Philipstown	0·00
Boschfontein	
Petrusville	
The Willows, Middelburg ...	
Naauwpoort	
Middelburg Gaol	0·58
Do.	
Middelburg Government Farm ...	
Jackalsfontein	0·25
Ezelpoort	0·25
Plaatberg	0·25
Grape Vale	0·25
Ezelfontein	0·25
Roodepoort	0·25
Groenkloof	0·25
Vlakfontein	0·25
Vogelsfontein	0·25
Plaatfontein	0·25
Colesberg	0·10
Tafelberg Hall ...	
Rietbult, Colesberg Bridge ...	
Fish River	0·18
Varkens Kop	0·14
Culmstock	0·24
Droogefontein	
Stonehills	
Cradock Gaol	0·21
Witmoss	0·17
Varsch Vlei	
Maraisburg	0·15
Steynsburg Gaol	0·00
Riet Vlei...	
Hillmoor...	
Quagga's Kerk	
Tarkastad	0·43
Do., Dis. Engineer ...	0·11
Drummond Park	
Glen Roy	
Waverley	0·16
Gannapan	
Montagu...	
Grape Vale	
Rietfontein, Cradock ...	
Schuilhoek	0·46
Vosburg	0·00
Zwavelfontein	0·17
Holle River, Colesberg ...	0·20
The Meadows, Schoombie ...	0·00
Cradock Station	0·24
Rietfontein, Colesberg ...	0·16

IX. NORTHERN BORDER:	INS.
Pella	
The Halt	
Keimoes	
Kenhardt	0·00
Upington	0·22
Trooilapspan	0·13
Van Wyk's Vlei	0·02
Prieska	0·09
New Year's Kraal	0·00
Dunmurry	0·17
Karree Kloof	0·12
Griquatown	0·05
Campbell	
Douglas	0·32
Avoca, Herbert	
Hope Town	

IX. NORTHERN BORDER (*con.*):	INS.
Orange River	
Newlands, Barkly West ...	0·03
Barkly West	0·11
Bellsbank	0·08
Kimberley Gaol	0·06
Do. Stephens ...	0·12
Strydenburg	
Rietfontein, Gordonia	0·20

X. SOUTH EAST:	INS.
Melrose, Div. Bedford ...	0·02
Dagga Boer	0·25
Fairholt	0·20
Lynedoch	0·18
Alicedale	
Cheviot Fells	
Bedford Gaol	0·51
Do. Hall	0·42
Sydney's Hope	0·32
Cullendale	
Adelaide... .. .	0·17
Atherstone	0·38
Alexandria	0·64
Salem	0·15
Fort Fordyce	
Fountain Head	
Graham's Town Gaol ...	0·34
Do. Do. . ..	
Heatherton Towers	0·00
Sunnyside	0·23
Vischgat...	
Fort Beaufort	0·32
Katberg	
Balfour	
Seymour...	0·30
Glencairn	0·60
Alice	0·04
Lovedale...	
Port Alfred	0·33
Hogsback	
Peddie	0·00
Exwell Park	
Keiskamma Hoek	0·46
Cathcart Gaol	0·16
Cathcart, Forman	
Cathcart...	
Thaba N'doda	
Evelyn Valley	
Crawley	
Thomas Rivier	0·00
Perie Forest	
Forestbourne	0·78
Isidenge	
Kologha	
King William's Town Gaol ...	0·20
Do. Do., Dr. Egan	0·22
Stutterheim, Wylde... ...	
Do., Besté	
Fort Cunynghame	
Dohne	
Kubusie	
Quacu	
Blaney	2·15
Kei Road	
Berlin	
Bolo	
Fort Jackson	0·00
Prospect Farm, Komgha ...	0·34
Komgha Gaol	0·40
Chiselhurst	

X. SOUTH EAST (*con.*):	INS.
East London West	0·35
East London East	
Cata	
Wolf Ridge	
Dontsah	
Mount Coke	
Blackwoods	0·20
Albert Vale, near Bedford	0·35
Heatherton Towers Irrigation	0·35
Huxley Farm, Stutterheim	

XI. NORTH-EAST:	
Venterstad	0·06
Mooifontein	
Burnley, Cyphergat	
Burghersdorp Gaol	0·19
Ellesmere	0·25
Molteno	0·22
Lyndene	
Cyphergat	
Thibet Park	0·10
Sterkstroom Station	0·00
Do. Gaol	0·02
Rocklands	0·20
Aliwal North Gaol	0·09
Do. Brown	0·13
Do. Dist. Engineer	0·13
Buffelsfontein	0·00
Hex's Plantation	
Poplar Grove	
Carnarvon Farm	0·11
Halseton	0·11
Jamestown	0·20
Whittlesea	0·14
Queenstown Gaol	0·18
Do. Beswick	0·21
Rietfontein, Aliwal North	0·20
Middlecourt	
Dordrecht	0·11
Tylden	0·00
Nooitgedacht	
Herschel	0·28
Lady Grey	0·30
Lauriston	0·20
Lady Frere	0·02
Contest, near Bolotwa	0·13
Sterkspruit	
Doornkop	
Avoca, Barkly East	
Keilands	0·16
Palmietfontein	
Barkly East	0·07
Blikana	
Glenlyon	
Rhodes	0·15
Gateshead	
Cliftonvale	
Albert Junction	0·00
Queenstown, District Engineer's Office	0·28
Hughenden	0·11
Glenwallace	0·06
Indwe, District Engineer's Office	0·00
Bensonvale Inst., Herschel	
Cathcart, Queenstown	
Royal, Div. Albert	
Stormberg Junction, D.E.	0·33

XII. KAFFRARIA:	ins.
Ida, Xalanga	
Slaate, Xalanga	0·00
Cofimvaba	
Tsomo	0·12
N'qamakwe	0·35
Main	0·12
Engcobo	0·10
Butterworth	0·41
Woodcliff	0·00
Kentani	0·58
Maclear	0·00
Idutywa	
Bazeya	0·21
Willowvale	0·40
Mount Fletcher	0·00
Somerville, Tsolo	0·00
Elliotdale	0·45
M'quanduli	
Matatiele	
Umtata	0·07
Cwebe	0·92
Tabankulu	0·07
Mount Ayliff	
Kokstad	0·00
Do., The Willows	0·00
Seteba	
Flagstaff	0·50
Insikeni	0·02
Port St. John's	1·39
Kilrush, Sneezewood	
Umzimkulu	0·15
Mandileni	
Wanstead	
Cedarville	
Maclear Station	0·00
Elliot Station	0·00
Tabankulu, Akkins	0·00

XIII. BASUTOLAND:	
Mafeteng	0·15
Mohalies Hoek	0.24
Maseru	0·00
Teyateyaneng, Berea	0·00
Moyeni Quthing	0·29
Qacha's Nek	0·02
Leribe	0·09
Butha Buthe	

XIV. ORANGE RIVER COLONY:	
Bloemfontein	
Kroonstad	0·06

XV. NATAL:	
Durban, Observatorium	0·34

XVI. TRANSVAAL:	
Johannesburg	

XVII. BECHUANALAND:	
Taungs	0·00
Vryburg	0·00
Mafeking	
Setlagoli	0·00
Kuruman	0·00
Zwartlaagte	

XVIII. RHODESIA:	
Hopefountain	0·23
Rhodes Matopo Park	0·20

XIX. DAMARALAND:	
Walfish Bay	

DEPARTMENTAL NOTICES.

Railway Rebate on Oil used as Fuel for Irrigation Purposes.

In terms of Section 111 of Act No. 32 of 1906, and with reference to Government Notice No. 17 of 1907, it is hereby notified that from and after the date hereof, a rebate will be given under the following conditions upon the carriage paid for oil used as fuel for irrigation purposes.

LEWIS MANSERGH,
Secretary for Public Works.

July 27, 1907.

CONDITIONS.

1. The oil, crude or refined, comprised in any consignment must be for use and must be used solely as fuel for engines operated in connection with irrigation of land.
2. The Railway Department will in the first instance carry consignments of such oil fuel at the 3rd class rate, provided that each consignment is accompanied by a Declaration from the Consignee or ultimate Consignee on the annexed form "A," that the oil is actually to be used solely for purposes connected with land irrigation from a Pumping Engine duly registered in the Public Works Department, the registered number being quoted.
3. Rebate of one-half of the rate originally paid will subsequently be made on presentation of a Certificate on the subjoined Form "B," which must be declared to by the applicant in the presence of the Resident Magistrate of the Fiscal Division within which the irrigation is carried on.
4. Consignments of oil under this notice will be carried only at "Owner's Risk."
5. Applications for rebate must be addressed to the Secretary for Public Works, accompanied by the Railway receipts for carriage paid and by the required Declaration on the Form "B."
6. The Government reserves to itself the right of accepting or declining to admit any application under these Regulations and the decision of the Commissioner of Public Works in this respect must be accepted as final.
7. Copies of these Regulations are obtainable from all Civil Commissioners or from the Secretary for Public Works, Cape Town.

"A."

DECLARATION OF CONSIGNEE OR ULTIMATE CONSIGNEE.

I, ... of the farm .... in the Division of .... certify that the oil described in the attached consignment note to be delivered at............................ Station for conveyance to.......... Station, for my account is actually to be used solely for purposes connected with land irrigation from a Pumping Engine (registered with the Department of Public Works as No.), of which I am duly registered proprietor.

I hereby accept and undertake to be fully bound in every respect by the conditions published under Government Notice No. 369 of 27th July, of 1907, with which I have fully acquainted myself.

....

Signature of Consignee or ultimate Consignee.

E

"B."

DECLARATION OF ENGINE OWNER WHEN APPLYING FOR REBATE.

Division of..

I, ... of .... Ward .... Division .... do hereby certify and solemnly and sincerely declare that the quantity of oil specified in the accompanying railway receipt (or receipts) for carriage paid has, in terms of Government Notice No. 369 of 27th July, 1907, been actually and wholly used in connection with the operation of a Registered Pumping Engine No..........for the purpose of land irrigation on my farm................. .... in the Division of .... and I make this solemn Declaration conscientiously believing the same to be true and correct in all particulars.

Date ....

....

Signature of Applicant.

Declared before me . .. . this .... day of .... 190 .. .

....

Resident Magistrate.

Water Boring under Government Subsidy.

The subjoined Regulations for Water Boring under Government Subsidy will operate from and after this date until further notice.

Government Notices Nos. 718 and 1024 of 1904 on the above subject are hereby cancelled.

The maximum amount of Subsidy payable under these Regulations is 5s. (five shillings) per foot.

Subsidy will be payable only in respect to Boring operations prosecuted *bona fide* for discovery of water for Agricultural and Stock-farming pruposes.

All applications are subject to approval before any work is commenced.

LEWIS MANSERGH,
Secretary for Public Works.

October 12th, 1905.

REGULATIONS.

PART I.—BORING BY ORDINARY CONTRACT.

1. PARTIES TO ARRANGE CONDITIONS.—Applicants and Contractors will at their own cost and risk mutually conclude all arrangements without reference to the Government, but must submit their contract for approval before work is actually undertaken, and must bind themselves to observe these Regulations. The responsibility of the Government will be confined solely to the payment of subsidy. Any special arrangement or conditions (not inconsistent with these Regulations) which may be agreed to between applicants and Contractors should be clearly endorsed upon the agreement form "A," and signed by both parties for their mutual protection.

2. CONTRACTS TO BE APPROVED PRIOR TO COMMENCEMENT.—All agreements must be formally approved by the Government, *before work is commenced.*
Subsidy will not be paid in respect to Contracts not thus approved.

3. CONTRACTS TO BE SUBMITTED SINGLY.—Not more than one contract or agreement may be submitted for approval at any one time in respect to any one Drill.

4. LIMIT OF SUBSIDY.—The Government Subsidy will not exceed one-half of the Contract cost per foot to applicant, including cost of lining tubes, up to a maximum of 5s. (five shillings) per foot. No subsidy will be payable to persons who have had the services of a Government Drill subsequent to the 30th June, 1904, or who have re-

ceived Subsidy for work completed after that date. *Subsidy will be payable to the applicant, through the Civil Commissioner of the Division*, after submission of applicant's Certificate Form "B" and of Contractor's Certificate Form "C" that he has received payment for work actually performed under the Contract.

5. Suspension of Subsidy.—In the event of collusion or improper arrangement between the parties to any Contract, payment of Subsidy may be withheld by the Government without any liability, and without any detriment to the rights of action under any law. In respect to refusal of subsidy under this Section, the decision of the Commissioner of Public Works shall be final. No Subsidy shall be payable in respect to any hole, the site of which may be condemned under this Section, or upon which the expenditure of public funds is not considered to be warranted.

6. Selection of Sites.—Selection of sites for boreholes shall be arranged between the Contracting parties.

7. Maximum Depth.—The Maximum depth in respect to which subsidy shall be paid under these Regulations shall be 300 feet upon one farm, unless a greater depth be specially authorised. Subsidy shall not be payable on any one farm in respect to more than two holes yielding water in reasonable quantity. In cases where shallow trial holes may be abandoned on account of unfavourable geological indications, or where for other approved cause shallow holes may be bored without success, subsidy will be allowed for such holes provided the maximum of 300 feet be not exceeded.

8. Character of Work.—All Contractors shall undertake to perform all work entrusted to them in a thorough and workmanlike manner, and to prosecute operations with all despatch to the satisfaction of the applicant, and to line the holes wherever the material shall require it with swell or flush jointed tubes of approved pattern. All holes must be true and perpendicular, and no hole will be accepted for subsidy which is less than 3¼ inches in diameter. All work will be subject to inspection when deemed necessary, and must be approved before payment of Subsidy.

9. Cessation of Work.—Upon cessation of work in, or abandonment of, any hole, the Contractor *shall forthwith* notify the fact to such Officer as he may be directed to communicate with, stating the reasons for such abandonment or cessation of work; shall furnish a section of the hole on a form which will be supplied by the Government for the purpose, and shall supply such other information as may be required in respect to results and other matters. All Contracts should include conditions upon which work in any hole may be terminated or the hole abandoned.

10. Contract Work Undertaken by Farmers or Farmers' Syndicates.—"Contract" work in the ordinary sense of the term when undertaken by Farmers or Farmers' Syndicates for persons who are not interested in or are not part owners of any drill employed, will be accepted for Subsidy under Part I. of this Notice.

11. Prepayment of Telegrams.—*Replies to telegrams seeking approval of Contracts must be prepaid.*

PART II.—CONDITIONS FOR BORING BY FARMERS, FARMERS' SYNDICATES, OR CO-OPERATIVE SOCIETIES.

12. The foregoing Regulations shall *mutatis mutandis* apply to work done by individual farmers with their own Drills upon their own property, or by Syndicates or Associations of Farmers formed for the purchase and working of Drills upon the properties of their members. All such work must receive approval before it is commenced; and, a statement of the *actual cost* incurred upon each hole must be declared to before a Justice of the Peace or the Resident Magistrate of the District, and submitted with the application for payment of subsidy. The Subsidy payable will be one-half of such actual cost per foot, subject to a maximum of five shillings per foot. A statement of actual cost in respect of each hole bored will be required on Form "E." In all cases Subsidy will be payable *direct to the farm owner*, whether he be the sole owner of the Drill or a member of a Co-operative Syndicate or Association. Farmers' Syndicates or Farmers' Co-operative Societies proposing to operate under this clause should apply upon the Form "D."

DEPARTMENTAL PUBLICATIONS.

The following pamphlets, reprints, etc., are obtainable on application to the Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town. Members of Farmers' and Fruit Growers' Associations applying for same through the Secretaries of these Associations are supplied free of charge.

Agricultural Miscellanea, price 6d. each. Extracts from Vol. I. to V. of *Agricultural Journal.*

Artificial Grasses and Fodder for Stock; Ensilage; Treatment of Cereal and other Crops; Viticulture and Wine Making; Forestry; Locusts and their Destruction; Possible New Industries for Cape Farmers; Dairying; Fruit Culture (6d.).

Agriculture.

Wheat Production in Australia (1s. 6d.) by A. C. Macdonald; *Wheat Production in Australia (1s. 6d.) by W. Halse and J. D. J. Visser ; Hop Cultivation (3d.) translated by A. W. Heywood; *Brak Land in Relation to Irrigation and Drainage (1d.); The Velvet Bean (1d.); Potato Disease (1d.); Scheme of Manurial Experiments (1d.); Leguminous Forage Crops for Trial in Cape Colony (1d.); Sundry Forage Crops for trial in Cape Colony (1d.); Poultry in South Africa: Rearing, Management and Improvement, with notes on Prevalent Diseases and Internal and External Parasites (3d.); The Salt Bushes (1d.); Tobacco Culture by P. Bornemisza (1d.); The Cultivation of Tobacco in the Colony by K. Schenck (3d.); Tobacco Wilt in Kat River Valley (1d.); *The Process and Appliances for the Flue Curing of Tobacco (3d.).

Dairying.

Dairy Breeds by A. C. Macdonald (9d.); *Dairy Industry in Great Britain by A. C. Macdonald (6d.); *Dairy Industry in Denmark (2d.); Ready Reckoner for Cream Testing (1s.); †Dairy and its Products by D. Hutcheon (2d.); *Cheddar Cheese Making (1d.).

Entomology.

The Bont Tick (1d.); Bean Bruchus (1d.); Cabbage Aphis (1d.); Codling Moth in Madeira Fruit (1d.); *Codling Moth (1d.); Fruit Fly (1d.); Fumigation Supplies (1d.); Insect Friends and Foes (1d.); Methods of Locust Destruction (1d.); *Peach Yellows (1d.); Pear Slug, Paris Green (1d.); Remedy for Mestwurmen (1d.); *Spray Calendar (1d.); *Spray Pump Notes (1d.); Scale Insects on Ornamental Trees and Plants (1d.); Two Pine Apple Pests (1d.); Tree Fumigation in California (1d.); Winter Spraying (1d.); Wattle Bag Worm (1d.); Bordeaux Mixture (1d.); Death Head Moth Superstition (1d.); Fumigation under Box Covers (1d.); The House Fly (1d.); New Oak Tree Pest (1d.); Nursery Inspection and Quarantine Bill (1d.); Potato Tuber Moth (1d.); The Codling Moth: Notes on its Life Cycle and Remedies (1d.); Gall Worms in the Roots of Plants (1d.); *The Fruit Fly (with coloured plates), (3d.); Another Introduced Scale Pest (1d.); Washes for Red Scale (1d.); Fruit Fly: Peach Fly Moth (1d.); Lime Salt Wash for Scale Insect (1d.); The Fruit Moth (1d.); Fusicladium of the Apple and Pear (1d.); Mealie Stalk Borer (3d.)—*coloured plate*; Cleaning up Nursery (1d.); Natural Enemies of the Fruit Fly: Report on Investigations in Brazil (1d.); Locust Birds and Locust Poison (1d.); The Brazil Fruit Fly Parasites (1d.); Cyanide Gas Remedy for Scale Insects (3d.); Arsenate of Lead (1d.); The Antestia Fruit Bug (1d.); Caterpillars Destroying Trees (1d.).

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

Forestry.

British National Forestry (1d.); Botanical Observations on Forests in Eastern Pondoland (1d.); †Elementary Principles of Sylviculture or Woodcraft (1d.); National Forests (1d.); Indigenous Timbers of the Cape (1d.); Misuse of Coal and the Uses of Forests (1d.); Tree Planting for Timber and Fuel (1d.); Tree Planting for Farmers (1d.).

Fisheries.

Trout and Carp Breeding and Stocking of Streams (1d.); *Methods of Preserving Fish by Smoking (1d.); Portable Floating Hatching Box for Trout Ova (1d.); The Protection of Trout (1d.); The Ocean and its Resources (1d.).

Horticulture.

Fruit Culture in the Gamtoos River Valley (1d.); *Marketing of Fruit (1d.); The Olive at the Cape (2d.); Tomatoes and Fruit for Export (1d.); Citrus Culture in Cape Colony: Report of the Citrus Commission (1d.); *Fruit from Orchard to Buyer (1d.); Netting for Fruit Trees (1d.); Fruit Culture in Argentina (1d.); Vegetables for Exhibition (1d.); Chrysanthemum Rust (1d.).

Veterinary and Animal Industry.

*Anthrax, Charbon, Mitzbrand or Miltziekte (1d.); *Heartwater (1d.); *Malarial Catarrhal Fever of Sheep (1d.); Rinderpest: Dr. Koch's Report (1d.); *Inoculation against Rinderpest (1d.); Dr. Kohlstock's Report on Inoculation for Rinderpest (1d.); *Redwater, Texas Fever or Tick Disease (1d.); *Redwater, Anthrax and Quarter Evil (1d.); *Sheep and Wool (1d.); The Eye and its Diseases (1d.); Husk, Hoose or Parasitic Disease of the Lungs of Cattle, Sheep and Pigs (1d.); Tick Heartwater Experiments (1d.); Indigestion and Diarrhœa in Calves (1d.); Persian Sheep and Heartwater (1d.); Poisoning of Stock (1d.); Retention of the Fœtal Membrane, or Afterbirth in Cows (1d.); Stijfziekte, Lamziekte or Osteo-Malacia and Paralysis (1d.); Tuberculosis and the Use of Tuberculin (1d.); African Coast Fever, with Description of Dipping Tank (3d.); *Rinderpest in South Africa (3d.) by D. Hutcheon; *Fluke or Slak in Liver of Sheep (3d.)—*coloured plate*; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte (1d.); Osteo Porosis (3d.)—*coloured plates*; *Glanders (3d.)—*coloured plate*; *Animal Castration (1d.); *Preventive Inoculation for Redwater (1d.); *Abortion in Cattle (1d.); Treatment for Worms in Domestic Animals (1d.); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia or Pleuro-Pneumonia-Bovum-Contagiosa (1d.); *Swine Fever, Hog Cholera or Pig Typhoid (3d.)—*coloured plates*; Castration of Females and Animals other than the Horse (1d.); Poisoning of Horses by *Ornithogalum Thyrsoides* or Chinkerinchee (*coloured plate*) (3d.); Horse Sickness by D. Hutcheon (2d.); Ticks and African Coast Fever (1d.); Cirrhosis of the Liver in Stock (1d.); Liver Disease among Calves (3d.); The Arsenite of Soda Dipping Mixture (1d.); *Lampas; Preventive Vaccination against Anthrax.

Viticulture.

†Reports on Viticulture (3d.); *Reconstitution of Phylloxerised Vineyards (1s.); Report on Failure of Hanepoot Grapes on American Vines (1d.); The Making of Wine and its By-Products (6d.); How to Treat Wine Casks (1d.); Failure of Vines (1d.); Manufacture of Dry Wines in Hot Countries (3d.); Anthracnose in Constantia (1d.).

Miscellaneous.

Game Seasons (3d.); Land Laws of Cape Colony (1d.); †Monsonia: the Cape Cure for Dysentery (1d.); *Rainfall in South Africa (1d.); Sand Dunes of Gascony (5d.); The Metric System (1d.); South African Stud Book Constitution, Rules, etc. (1d.); Bars in Ostrich Feathers (1d.); *Information regarding the Mining Laws (1s.); The Preservation of Game in Cape Colony.

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 20th July, 1907, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat	B. Wheat Flour	C. Boer Meal	D. Mealies	E. Mealie Meal	F. Barley	G. Oats	H. Oat-hay	J. Potatoes	K. Tobacco (Boer Roll)	L Beef	M. Mutton	N. Fresh Butter	O. Eggs	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	per 100 lbs.	per 1 0 lbs.	per 100 lbs.	per 100 lbs.	per 1(0 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per lb.	per lb.	per lb.	per lb.	per doz.		
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	s d	s d	£ s d	s d		
Aliwal North ..	0 8 0	0 17 6	0 12 6	0 4 0	0 7 9	0 6 0	0 6 0	0 7 6	0 3 0	1 6 to 2 -	0 0 6	0 0 6	0 1 6	0 1 2	£7 to £9	14/ to 19/-
Beaufort West ..	0 10 0	0 15 0	0 12 0	0 8 6	0 10 0	0 9 0	0 8 9	0 5 6	0 8 0	0 0 10	*6d., 1/-	*6d., 7d.	0 1 6	0 2 0	£15.	22/6
Burghersdorp ..	..	..	..	0 4 9	..	..	..	..	0 3 9	0 0 6	0 0 8½	0 0 5½	0 1 4	0 1 3	..	..
Cape Town ..	..	..	..	..	..	..	..	..	0 8 4	..	..	..	0 1 2	0 1 9	..	..
Clanwilliam ..	0 12 0	..	0 13 0	0 7 0	..	0 7 0	0 8 0	..	0 6 6	0 1 0	0 0 7½	0 0 7	0 1 3	0 1 3	..	..
Colesberg	..	..	..	0 12 0	..	..	..	5 2 to 5 3	..	..	0 0 4	0 0 4	1 2 to 1 6	1 3 to 1 6	..	..
Cradock	..	..	..	0 6 6	..	..	0 7 6	0 6 0	0 11 6	0 0 4	0 0 5	0 0 4	0 1 9	0 1 3	£11	17/-
Dordrecht.. ..	0 7 0	0 13 0	0 10 0	0 7 0	0 7 0	0 4 0	0 5 0	0 3 0	0 3 6	0 1 0	0 0 6	0 0 2¼	0 4 1	0 1 0	£10	16/-
East London ..	0 7 0	0 10 6	0 9 0	0 5 3	0 8 0	0 5 0	0 4 9	0 4 9	0 6 0	0 1 6	*†0 0 7	*†0 0 7	0 2 3	0 1 5	£31	36/-
Graaff-Reinet ..	0 9 0	0 9 0	0 8 6	0 6 0	..	0 5 0	0 5 0	0 4 6	0 4 0	0 2 0	0 0 5	0 0 5	0 1 6	0 1 6	£11	13/6
Graham's Town ..	0 6 0	..	..	0 6 0	..	0 4 0	0 6 6	0 5 11	0 9 6	0 0 6½	0 0 6½	0 0 6¾	0 1 9	0 1 8½	..	..
Kimberley ..	0 10 0	0 15 0	0 13 6	0 5 0	0 6 3	0 7 6	0 8 0	0 6 6	..	0 0 7½	0 0 10	0 0 8	0 1 4	0 1 6	£9 to £13	15/- to 20/-
King Wm.'s Town..	0 8 0	0 14 6	0 12 6	0 5 0	0 6 6	0 5 0	0 6 0	0 4 0	0 8 6	0 3 4	0 0 10	0 0 10	0 2 0	0 1 3	£12 10s.	26/-
Malmesbury ..	0 9 0	0 15 0	0 10 0	0 7 6	..	0 8 6	0 7 6	0 4 6	0 15 0	0 3 6	0 0 6	0 0 6	0 1 4	0 1 4	£12 10s.	24/-
Mossel Bay ..	0 10 0	0 13 6	0 12 0	0 6 6	..	0 5 0	0 5 0	0 5 0	0 13 6	0 0 8	0 0 8	0 0 7	0 1 6	0 0 10	..	..
Port Alfred ..	0 8 6	0 15 0	0 14 0	0 4 0	0 10 0	0 5 0	0 6 0	0 5 0	0 12 0	0 0 6	0 0 6	0 0 8	0 1 9	0 0 9	..	..
Port Elizabeth ..	0 7 0	..	..	0 6 0	..	0 4 3	0 6 6	0 4 9	0 10 6	..	0 0 6	0 0 7	0 1 6	0 2 0	..	..
Queen's Town ..	0 5 6	0 9 3	0 5 3	0 5 0	0 4 0	0 4 9	0 5 6	0 4 9	0 5 0	0 1 0	*0 0 6	*0 0 5½	0 1 9	0 1 6	£15	21/- to 28/-
Tarkastad.. ..	0 12 0	0 13 0	0 12 0	0 7 6	0 9 6	0 5 6	0 10 0	0 5 6	0 5 0	0 1 0	*0 0 5	*0 0 5	0 0 6	0 1 6	£10	20/-
Vryburg	0 12 0	0 18 0	0 14 0	0 7 6	0 8 6	0 10 0	0 11 0	0 8 0	0 11 6	..	..	..	0 1 6		..	
Worcester	0 9 6	0 13 6	0 10 3	0 6 0	0 7 0	0 8 0	0 7 6	0 5 0	0 8 6	0 0 6	*3d. to 9d. †5d. to 9d.	*5½d. to 6d. †5½d. to 6d.	0 1 6	0 1 6	£12 to £17	21/- to 25/-

NOTE.—A blank space denotes "no transactions. *Colonial. † Frozen.

THE PRODUCE MARKET.

CAPE TOWN.

Mr. R. Müller, of Strand Street, reports for the month ending July 31 :—

Ostrich Feathers.—A fair amount of business has been done, and I have found no difficulty in moving parcels of average good quality. Common class of wings and ordinary short goods are weak and irregular. Sellers must be prepared to make some concession on such lots.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Super Primes	17	10	0	35	0	0	Floss	0	5	0	1	10	0
Firsts, ordinary to Super	11	0	0	14	10	0	Long Drabs	2	10	0	4	0	0
Seconds	8	0	0	9	10	0	Medium Drabs	1	5	0	2	0	0
Thirds	6	0	0	7	10	0	Short to Medium ...	0	10	0	1	15	0
Femina Super	12	0	0	16	0	0	Floss	0	2	6	1	10	0
Femina, Seconds to Firsts	5	10	0	10	10	0	White Tails	1	15	0	3	15	0
Byocks (fancy)	5	10	0	9	10	0	Coloured Tails	0	10	0	2	10	0
Long Blacks	3	10	0	7	10	0	Chicks	0	1	0	0	2	0
Medium Blacks	2	0	0	3	0	0	Spadonas	2	10	0	5	0	0
Short to Medium ..	0	10	0	2	10	0	Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—The London Wool Sales closed on the 24th of last month. There was an active demand, but prices were a little lower as compared with the previous auctions. Ordinary Snow Whites were ½d. cheaper, Medium ½d. to 1d. cheaper. Inferior Grease and Clothing Wools from par to ¼d. cheaper, while Combing Wools were from par to ½d. dearer.

In our Market there is little change, a few lots of Calvinia Grease have been offered, realising according to condition from 6¼d. to 7d. per lb. There is good enquiry for Snow Whites at practically unchanged rates, but very little is offering.

	s.	d.	s.	d.		s.	d.	s.	d.
Super long Grass Veld	0	8	0	10	Snow-white, Super to Extra	1	7	1	9½
Do. Karoo	0	6¾	0	7¾	Do. Ordinary	1	1	1	5½
Medium	0	5	0	5¾	Fleece, washed	0	0	0	10
Short and Inferior	0	4	0	4½					
Wool for washing	0	4½	0	6					

Mohair.—The market remains quiet, and offerings have been small in consequence; sellers are holding for higher prices. 13½d. is being offered for good Summer Firsts, but sellers decline to accept this price. Summer Kids have realised up to 18d. for super lots. Although enquiry is somewhat limited, the trade is said to be in healthy condition.

	s.	d.	s.	d.		s.	d.	s.	d.
Firsts, Summer	1	1½	1	6	Winter...	0	10½	0	11
Kids	1	3	1	6	Do. Kids	1	1	1	2
Seconds	0	6½	0	9					

Hides and Skins.—There is a steady demand. Wool Skins remain unchanged, but Goat Skins are lower.

Buchu Leaves.—There is little offering at the present time. The Market remains unchanged.

PORT ELIZABETH.

Messrs. John Daverin and Co. report under date July 26:—

Ostrich Feathers.—There was only three days' sale held this week, when a fair average assortment was offered. Competition was erratic, but on the whole there was no quotable change in prices; there was an attempt made to-day to hold a sale, but owing to want of competition it had to be abandoned, buyers evidently preferring to wait until they hear the result of the London Sales which open on Monday next, the 29th instant. A limited amount of business has been done out of hand at current rates. The total value of Ostrich Feathers sold on the Municipal Sales this week amounted to £16,086 14s. 2d., and weighed 6,532 lbs. 9½ ozs.

	£	s.	d.	£	s.	d.
Primes: Extra super			Special Prices.			
Good to super	15	0	0	20	0	0
Whites: Firsts ...	11	0	0	15	0	0
Seconds	7	0	0	10	0	0
Thirds	2	10	0	6	10	0
Feminas:						
Super	11	0	0	16	0	0
Firsts	8	0	0	10	0	0
Seconds	4	10	0	7	0	0
Thirds	2	10	0	3	10	0
Greys	4	10	0	8	0	0
Fancy	5	10	0	9	0	0
Tails: White ...	1	10	0	3	15	0
Light ..	1	5	0	3	0	0
Coloured & Dark	0	5	0	1	2	6

	£	s.	d.	£	s.	d.
Blacks: Long ...	3	10	0	5	10	0
Medium	1	5	0	2	10	0
Short	0	10	0	1	0	0
Wirey	0	1	0	0	1	0
Floss	0	6	0	1	5	0
Drabs: Long ...	1	10	0	4	0	0
Medium	0	12	6	1	0	0
Short	0	2	6	0	6	0
Wirey	0	0	6	0	1	0
Floss	0	6	0	1	5	0
Spadonas: Light	1	15	0	5	0	0
Dark	0	10	0	2	10	0
Chicks . .	0	0	3	0	2	6

Wool.—The London Sales closed on Wednesday last. Our cable reports grease firm; Snowwhites ½d. to 1d. lower. Our market remains steady, and all lots arriving meet with ready sale at full prices. On the public market, yesterday, only a very small quantity was offered; prices showing no change.

Snowwhite, Extra Superior ...	20d	to 21½d
Do. Superior	18d	„ 20d
Do. Good to Superior...	16½d	„ 17½d
Do. Inferior Faulty ...	16d	„ 16½d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	9½d	„ 10d
Do. do. do. ...	8d	„ 9d
Do. do. Karoo grown (special clips)	7½d	„ 8d
Do. do. do. ...	6½d	„ 7d
Do. do. Mixed Veldt...	5¾d	„ 7d
Do. Light, faultless, medium Grassveldt grown ...	6½d	„ 7¾d
Do. do. Karoo grown	6d	„ 6¼d
Do. do. short, do	5½d	„ 5¾d
Do. short, faulty and wasty	6¼d	to 7d

Grease, Coarse and Coloured ..	4¼d	to 4½d
Scoured do. do. ...	6½d	„ 12d
Basuto Grease, short ...	6½d	„ 7d
O.R.C. Grassveldt Grease, long long & well-conditioned (special clips)	7½d	„ 8d
Do. do. do. ...	6½d	„ 7½d
Do. do. medium grown, light, with little fault ...	6d	„ 6½d
Do. do. short, faulty & wasty	5d	„ 5½d
Do. do. Karoo grown, long & well-conditioned ...	6¼d	„ 6¾d
Do. do. medium grown, light with little fault ..	5d	„ 6d
Do. do. short, faulty and wasty...	4½d	„ 5d

Mohair.—This market remains very quiet, and no sales of Summer Firsts have been made. Buying orders for best clean lots are still at 13½d., which sellers decline to accept. Some business has been done in Summer Kids at 18d. for best parcels. On the public market, on Tuesday, a fair quantity was offered, but the tone of the market was weak, and the bulk of the offerings was withdrawn.

Super Kids	17½d	to 17¾d
Ordinary Kids	16d	„ 17d
Superior Firsts, special clips (nominal)	14d	„ 14½d
Ordinary Firsts...	13½d	„ 14d
Short Firsts	12½d	„ 13d
Superfine Long Blue O.R.C. Hair, nominal	14d	„ 14½d

Mixed O.R.C. Hair (average)	11d	to 11½d
Do. very mixed ...	10d	„ 10½d
Seconds and Grey	8d	„ 9d
Winter Kids, special clips ...		14½d
Thirds	6d	„ 6d
Do. good ordinary ...	13d	„ 14d
Winter Hair	11d	„ 11½d

Skins.—Sheepskins sold this week, in bundles, at 7d. per lb.; Pelts, 6d.; Capes, 1s. 8d. each, damaged, 7d. each; Goat, 11d., damaged, 6d. per lb.; Angoras, 9d.; Shorn, 7d.; damaged, 4½d. per lb.

Hides.—Sundried sold at 8½d., damaged, 6 per lb.; Drysalted, 7½d., damaged, 6½d. per lb.; Madagascar hides, 7d., damaged, 5½d. per lb.; Thirds, 3½d. per lb.

"Ruberoid" for the Farm.

Our attention has been called to the substance known as "Ruberoid," advertised in our business pages, and from samples submitted it seems to be admirably suited for farm buildings and other purposes. Originally intended only as a roof covering, it is now successfully employed for a variety of most useful purposes, the composition of "Ruberoid" being of such a nature that it is water, acid, alkali and weather proof. The makers claim that it contains neither tar, rubber, asphalte nor other short-lived ingredients. It is now in extensive use all over the world for lining open roof tanks, farm dams, flat or garden roof coverings, floor cloths, etc., and on account of its pliability is most suitable for gutters, water furrows, dome coverings, and also in taking the place of lead or zinc for making flashing round skylights, damp course for building foundations, etc. A special jointing cement accompanies each roll, and in the case of tank or dam lining, as a finishing water-proof coat Rubberine paint may be applied as required every few years to renew its impermeability. The material is made in four grades of thickness, and is put up in rolls 24 yards long by one yard wide. It costs from 22s. 6d. to 45s. per roll, and the price includes cement, nails and caps; the latter are required for fixing the material on the roof. The nails and caps would be found useful in the event of it being necessary to fix the dam lining to wood battens, in which case the wood should be soaked previously in a good wood preservative, such as "Jodelite," which is claimed to be an efficient protection against fungus, dry rot, natural decay or the attacks of all parasitic insects, as well as rats, sea worms, &c. Three-ply is recommended as the most useful for dams, tanks and roof floorings, two-ply for ordinary roofs, gutters and water leadings, one-and-a-half-ply for roofs and sides of cow-houses, stables, fowl-houses and such like purposes. It seems to be easily and readily handled and has a good appearance.

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for **2s. 6d.**, (minimum charge) per insertion, and **6d.** per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY, 125-127, Long Street, Cape Town, to whom all communications should be addressed.

CATTLE.

JERSEYS.—Thoroughbred Herd. Celebrated Island bred bull "Clove," and several of the best cows and heifers from Mr. H. W. Struben's late herd.—Mrs. A. A. Dunn, De Tuin, Piquetberg.

Thoroughbred pedigree **JERSEY BULLS** for sale, from Imported or Colonial bred prize stock, good milking strain. For particulars, apply to SUPERINTENDENT, Porter Reformatory, Tokai, P O., Retreat.

PURE FRIESLANDS.—Enquire for cows, young bulls, and heifers. Oldest pure herd in Eastern Province. Grand milkers. Prize stock. Also, Colonial Rambouillet Flock Rams, limited number. F. F. WIENAND, Bellevue, Bedford, C.C.

R. Cross, HILLSIDE. P O. BOLOTWA. Has high-class Friesland bulls for sale. Herd may be seen by appointment. Bulls from Imported and Colonial Cows.

SHEEP.

Pringle Bros. — **RAMBOUILLET MERINO RAMS.** Sold only at the Bedford Ram Breeders' Fairs at dates published PRINGLE BROS., Glen Thorn, P.O., Linton, Adelaide

R. Pell Edmonds, RIPPLEMEAD, DOHNE, Breeder of Pure-bred **PEDIGREE MERINO SHEEP** and **PEDIGREE BLACK WELSH CATTLE.**—For particulars see page xxxiii.

HORSES, &c.

For Sale. Imported **CLEVELAND STALLION:** sire, Pitch & Toss, 3 years champion in succession; foaled 1897. Royal Horse Show Prize Winner. Quiet to ride and drive; tried at stud. A bargain. W. J. WALSH, Klein River Estate. P.O., Stanford, Caledon, C.C.

CATALONIAN JACKS.—Pure Catalonian Yearling Jacks from thorough-bred Imported Sire and Catalonia Jennies imported from Mexico, for Sale—MATABELE THOMPSON, Carnforth Hill Estate, Post Bag, Klipdam.

PIGS.

BERKSHIRE PIGS thorough-bred, pedigree boars and sows, from Imported stock, winners of numerous prizes. For particulars, apply to SUPERINTENDENT, Porter Reformatory, Tokai, P.O., Retreat.

OSTRICHES.

Specials only. —Chicks, £5 to £20 each; Young Birds, £10 to £30.—F. W. BAKER, Laughing Waters, Willowmore.

GENERAL.

H. Vermaak, THE PINES, MARAISBURG, CAPE COLONY, has on hand and for sale at very reasonable prices, **PURE-BRED FRIESLAND BULLS** and **PURE-BRED MERINO RAMS** of the **RAMBOUILLET** breed

THOROUGH-BRED PERSIAN RAMS and **OSTRICHES.** HOUGHAM ABRAHAMSON, LONG HOPE SIDING, C.C. Breeder of Rams from progeny of ewes passed into Stud Book of Cape Breeders' Association Also selected Breeding Ostriches.

PASPALUM GRASS PLANTS. Quotations for plants, in bags free on rail Stellenbosch (keep moist long distance). See *Agricultural Journal*, May, 1906, page 622, or from A. C. BULLER, Dwarsriviershoek, Stellenbosch.

PURE BRED ANGORA GOAT RAMS. Bred from the Choicest Strains, and Prize-winners at the leading Agricultural Shows of Cape Colony. For particulars apply to A B. HOBSON, Matyrsford, Jansenville.

PERSIAN SHEEP and OSTRICHES.—**S. Montague Gadd,** SPRINGFIELD, TAFELBERG. Orders booked for young rams, from Stud Book Ewes and for Ostrich Chicks from the best strains in the country.

Wanted.—By two young Colonials (ages 20 and 21) employment on large farm in Eastern districts of Colony, with a view to obtaining knowledge of farming. Reply, stating terms, to W. S. FORBES, Box 171, East London.

THE POULTRY YARD.

BUFF ORPINGTONS. THE FARMER'S FOWL. The fowl that **LAYS WHEN EGGS ARE TOP PRICE** and are also A 1 table birds. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices Ask for inclusive quotations; carriage paid to any station in South Africa and **AT MY RISK** to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 9 years' standing **CAN HOLD ITS OWN AGAINST IMPORTED STOCK.** Buy hardy Colonial-bred birds and save your pocket. Eggs from pure-bred utility strain, 12/6. Address: A. C. BULLER, Dwarsriviershoek, Stellenbosch.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Croydon House, Faure, C.C.

WYANDOTTES.—(Silver, White, Partridge). **HOUDANS, ROCKS (Barred, White). LEGHORNS (White, Brown, Buff) BUFF ORPINGTONS; BLACK MINORCAS, all hardy fully-matured breeders of the best laying strains. EGGS, GUARANTEED FERTILE 10/- PER DOZEN, delivered nearest railway station, Cash or C.O.D. Single Stock Birds, breeding pens fit for coming season at reasonable prices.** H. HEESE, Paarl.

THE POULTRY YARD.—*Continued.*

WYANDOTTES AND LEGHORNS.—Exhibition and Utility Strains.

White and Silver Pencilled Wyandottes. White, Brown and Buff Leghorns, and White La Bresse.

Let results speak:—At Cape Town Open Show, July, 1907, my birds WON: 13 First, 4 Second, and 3 Third Prizes. At the Egg-Laying Competition my pens stood Second, Fourth and Sixth in the actual number of eggs laid. Particulars of stock and eggs on application. S. SMITH, Talana, Wellington Avenue, Wynberg.

TURKEYS.—MAMMOTH AMERICAN BRONZE.—HARDY STRAIN OF GREAT SIZE. Noted prize winners. Young stock for sale after April. Orders booked now. Ask for inclusive quotations. Carriage paid to any station in South Africa and AT MY RISK to rail destination. Eggs in season. Full particulars from A. C. BULLER, Dwarsriviershoek, Stellenbosch.

Hazel, Rondebosch. PRIZE POULTRY.—Andalusian White Wyandottes, Brown Leghorns and Rocks. Stock and Sittings for Sale. Inspection and Correspondence invited. R. HAZELL, Tregenna, Park Road Rondebosch.

APPLICATIONS FOR AGRICULTURAL EMPLOYMENT.

LOUIS EMIL MOULIN; Mount Nelson Hotel, Cape Town; aged 34; Unmarried; Wants employment on Farm. No previous experience in this Colony but has been employed in agricultural work in Switzerland, chiefly Wine-making.

E. A. MCDONALD, P.O. Box 73, Port Elizabeth: Desires situation as apprentice or assistant on farm: Age 21. Has had twelve months' experience in Ostrich, Goat, and Agricultural farming.

W. S. FORBES, P.O. Box 171, East London: Position on farm wanted by two young Colonials aged 20 and 21 respectively with object of learning farming: Eastern Districts preferred.

MISS JESSIE COTTINGHAM, The Agricultural College, Swanley. Kent. England: Wants employment as "Lady help" on farm in South Africa; eighteen years of age: at present studying at the Agricultural College, Swanley. Kent.

THE

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NOTES.

Sim's "Forest Flora of Cape Colony."

A limited number of copies of Sim's "Forest Flora of Cape Colony" (reviewed in this issue) are now available for disposal by sale at £2 2s. (two pounds two shillings sterling) each.

Supply of Redwater Vaccine.

It is notified for general information that the price of Redwater Vaccine issued by the Veterinary Laboratory, Graham's Town, will be one shilling (1s.) per dose instead of 6d. per dose as heretofore.

Wanted: Dried Locusts.

Quotations are invited by the Department of Agriculture for the supply of Dried Locusts during the forthcoming season in bags of not less than 75 lbs. nett, delivered free on rail at the nearest Railway Station. The Locusts must be thoroughly dried before being bagged, and the bags guaranteed free from earth or stones. It may interest our readers to know that two raisers of poultry in the Cape Peninsula state that as a poultry food they find dried locusts most suitable if given in the warm mash. That they then efficiently take the place of the imported American meat scraps, and are much cheaper.

Government College of Agriculture, Elsenburg.

The next term commences on the 15th January, 1908. In order to realise more effectively the object of the Institution, and in view of the limited number of vacancies and the numbers seeking admission, the Government has resolved in future to accept as students only those who furnish a guarantee in writing that they are prepared to take the full course of two years, reckoned from the 15th January. Preference will also be given to Cape Colonial candidates. The sum of £125 is offered as bursaries to the sons of parents not in a position to defray the whole cost of education. Full particulars can be had on application. Practical work in all branches is compulsory. Applications for admission should be made immediately to the Principal.

Vine Mildew—(Plasmopara Viticola)—Directions for Spraying.

1. *Preparation of Mixture for Spraying.*—Put 5 gallons cold water in a clean wooden tub, which can hold at least 10 gallons. Weigh off 2 lb. of Blue Stone (also known by the name Blue Vitriol or Sulphate of Copper), place it in a muslin bag or in a small canvas bag and suspend this in the water, so that the bluestone in the bag is just below the surface of the water; the bag must not be near the bottom of the tub. After some hours all the bluestone will have completely dissolved.

Now put two pounds fresh slaked lime into 5 gallons of water contained in another tub or vessel and stir well; pour this mixture of lime and water into the solution of the bluestone, being careful to introduce the whole of the lime sediment. Stir well with a clean stick for some minutes; the mixture will then be ready for use. Always stir the mixture properly before taking some of it for spraying. Never make more of the mixture than can be used up in spraying that same day.

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2. *Pumps.*—Various pumps could be used. Thus the Success Pump does very well for spraying relatively small numbers of vines and trellises, but for fairly big vineyards a Knapsack Pump should be employed. In every case the "Vermorel" nozzle is to be preferred on account of the fine spray it gives.

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3. *Time for Spraying.*—First time, when the young shoots are between 2 to 4 inches, before flowering, and second time three weeks later, when the berries have properly set. In case the Vine Mildew has appeared notwithstanding the two sprayings in consequence of damp weather, a third spray may be given about 4 to 6 weeks after the second spray. In any case no grapes are to be sprayed later than 20 days before they are to be picked.

Note.—Spray very thoroughly, and especially the upper sides of the leaves. When the spray gets dry on the leaves, the latter look bluish. In case rain has washed off the spray, before it got dry on the leaves, the spraying must be repeated. An illustration is being prepared showing the appearance of a vine leaf affected by Vine Mildew, and this will be distributed later on.

South African Products Exhibition, London, 1907.

The following are the awards in the Cape Colony Section of the above Exhibition:—Bees Wax: W. J. Hugh Wilson, bronze medal. Berry Wax: Johan C. Augusten and J. C. Faure, silver medals. Biscuits: Pyott Ltd., silver medal. Chutney: B. A. de Vries, jun., B. A. de Vries, sen., S. N. Pike (Hotch Potch), and D. M. Brown, bronze medals. Preserves: Rhodes Fruit Farms and Gerald and Co., silver medals; W. Cawthorne, bronze medal. Jams: Mrs. De Wet, Wellington Preserving Co., and Shepherd Bros., bronze medals; J. and H. Hards and Co. (Gooseberry), silver medal. Honey: W. J. Hugh Wilson, silver medal; W. Cawthorne, bronze medal. Mebos: P. J. Cillie, silver medal. Sugar Beet: Dr. A. J. Viljoen, M.L.A., bronze medal. Kaffir Corn: Dyer and Dyer Ltd., silver medal. Crystallised Fruit: Mrs. Van Niekerk, bronze medal. Fruits Syrups: Mrs. C. Marais, bronze medal. Canned and Bottled Fruit: The Western Province Preserving Co., silver medal. Fodder (Compressed): African Compressed Fodder Co. and S.A. Fodder Co., bronze medals. Mealies: J. P. Ainslie, silver medal; J. Browne, bronze medal; Kaffrarian Steam Milling Co., silver medal. Pulse (Beans, Peas, etc.): Barry Bros., silver medal. Tobacco: L. Stella (Cigarettes), Van Dyk (Tobacco), bronze medal. Fresh Fruit: Pickstone, gold medal; Naidoo and Co., and Rhodes Fruit Farms, silver medals; A. O. Barry, bronze medal; A. C. Buller (special) and Wright and Co. (Peaches), silver medals; H. Meyers, bronze medal. Mohair: O. Cawood, silver medal; R. Cawood and S. and E. Hobson, bronze medals. Ostrich Feathers: Sciama and Co., gold medal; J.

D. J. de Wet, D. J. and S. J. Marais, and J. J. le Roux, silver medals; — Southey, bronze medal; Upper Albany Farmers' Association, silver medal. Kaross (Silver Jackal): S. Solomon and Co., bronze medal; Wirsing Bros., silver medal. Boots: Lovedale Institute, bronze medal. Bark (Mimosa): Wardlaw and Co., bronze medal. Castor Beans: J. H. Shand, bronze medal. Raisins: H. J. Mulder, silver medal. Wools: Thesen and Co., silver medal. Cape Heaths: Mr. Pillans, silver medal. Buchu Leaves: Van der Byl and Co., silver medal. Cotton: A. T Fincham and — Evelyn, bronze medals. Pottery: J. E. Pearston, diploma. Granite: J. Allen and Brackenfelt Granite Co., diplomas. Herbs (Medicinal): A. C. Visser, bronze medal. Medicines: Africura Co., silver medal. Peppermint: W. E. Woods and Co., Ltd., bronze medal. Aloes: Prince, Vincent and Co. and Jacks and Co., bronze medals. Argol: Van der Byl and Co., bronze medals. Barks (Tanning): Louis Radcliffe, bronze medal. Grasses: S. V. van Niukirk, diploma. Olive Oil: Minnaar Bros., silver medal. Osiers: Lovedale Institute, bronze medal. Flowers (Everlasting): W. Spilhaus and Co., bronze medal. Almonds: C. P. Klapper and Barry Bros., diplomas. Walnuts: Jacob Burgen and H. J. Mulder, diplomas. Wool: J. H. King, diploma; T. T. Hoole, gold medal; M. la Grange and C. E. Paterson, silver medals. Rushes: Hon. C. W. H. Kohler, M.L.C., diploma. Reeds: Heidelberg Local Committee, diploma. Calabash Pipes: F. Hooper and N. Broide, diplomas; Blatter and Co., silver medal. Wines: Castle Wine and Brandy Co., gold medal; Van Ryn Wine and Spirit Co., bronze medal; Paarl Wine Co., silver medal. Brandy: Castle Wine and Brandy Co. and Van Ryn Wine and Spirit Co., silver medals. Liqueur (Van der Hum): Westmacott and Co., silver medal. Oats: Forrest and Co., bronze medal; R. Starke and J. J. Delport, diplomas. Oat Hay: N. Mette and J. F. Flynn, diplomas. Onions: D. le Roux and J. Bosman, diplomas. Lucerne, Hay: J. H. van Zyl, E. G. Goddard, Barry Bros., J. H. le Roux, and J. F. Flynn, diplomas. Barley: Barry Bros., diploma. Mineral Waters: Vasco Mineral Water Co. and Van Riebeek Mineral Water Co., bronze medals. Clays: R. Broughton, silver medal. Citrus Fruits (Lemons and Oranges): Flanagan Bros. and P. Malherbe (Lemons), bronze medals. Whipsticks: Prince, Vincent and Co., M. J. de Wet, and Barry Bros., bronze medals. African Patent Medicine: Sacco Co., silver medal.

Wool at the Exhibition—Judges' Reports.

The Wool Judges at the Exhibition report as under:—In compliance with your request we have carefully examined the exhibits of wool at the Exhibition, and have the honour to submit the following report:—There were eight exhibitors. 1. Mr. T. T. Hoole, 8 Fleeces.—This collection is the best wool in the Exhibition. 66/70s quality. Soft, sound, possessing excellent spinning properties, light in condition and altogether a most attractive breedy lot. 2. Mr. La Grange, Riversdale.—70s quality. Excellent in length, light in condition, soft, good character and breed. 3. Fleeces.—Well grown 66s quality, sound and a good line of wool. 4. Mr. C. H. Pietersen, Fleece.—Long, sound 64s quality. A big bulky fleece and an excellent type of a good commercial wool. 5. Fleece.— 64s quality, long in the staple. Weighty heavy cutting fleece, but too wasty. 6. Fleece.—Excellent 9 months' growth. Soft 66/70s quality. 7. Fleece.— Good useful 64/66s quality. A little deficient in length, and rather earthy at the tip of the staple. 8. Fleeces.—A nice lot of 66/70s quality. Long, soft and sound. 1st Place, Mr. T. T. Hoole. 2nd Place, Mr. M. La Grange. 3rd Place, Mr. C. E. Pietersen. Champion Exhibit.—The best wool in the Exhibition is Mr. Hoole's in the Cape Colony Section.

General Remarks.—The excellence of the wool exhibits will be a revelation on this side, and two questions will suggest themselves to merchants and manufacturers visiting the Exhibition. The first is, "If this is the kind of wool you can produce, why don't you send it to us? It is just what we want, and we will pay you good prices for it." The other is: "If your country can produce such wool as this why do you continue to grow such poor short indifferent undesirable stuff as we see in the London sales?" Good wool is always wanted and sells readily, poor short, earthy, flimsy wool of no character is often a drug on the market. A high class animal costs no more to feed than a poor one, and will produce double the value in wool. Careful selection of breeding stock and the ruthless culling from the stud of all Rams which are not of a high standard, will in time add hundreds of thousands to the income of the South African farmers without the addition of a single hoof to the number kept. In this connection we cannot too strongly recommend the action of the O.R.C. Government in going to Australia for high class flock sheep. We notice some of the samples exhibited contain an excessive amount of grease. We believe this to be a mistaken impression; the farmer should be encouraged to grow a wool as light in grease as possible. A word about skirting may not be out of place. The bellies, necks, leg pieces and britch should always be taken off the fleece and packed separately. That is the only way to obtain the top value, and the prices obtainable for each sort separately will work out to a much better average than if all are packed and sold together. We hope Cape Colony farmers will forgive us for saying that inasmuch as they grow the best wool their negligence in the matter of skirting is all the more marked. And in the same connection we desire to compliment the Orange River Colony on the improvement taking place under Government instruction in that Colony.—(Sgd.) T. H. MOORE, Wool Merchant, Huddersfield. (Sgd.) BYRON C. RONALD, Wool Broker, 24, Basinghall Street, London, E.C.

Mohair at the Exhibition—Judge's Reports.

The following are the Judge's Reports on the Mohair at the South African Products Exhibition in London:—R. Cawood.—A very pretty exhibit of lustrous well-bred hair, nice length, clean, beautiful quality and style, solid, and free from what is known in the trade as "kemp" (short dead hairs and which will not in manufacturing take the ordinary dyes, and consequently very undesirable). O. Cawood.—A very superior exhibit of clean, solid, bright, well-bred hair, nice length, and free from "kemp," and with very good quality and style. The product of a well-known flock, and, as an example of what South African Mohair-growers should aspire to, could scarcely be beaten, comparing, as it does, very favourably with some of the best types of Turkey Mohair. These remarks apply to both fleeces, firsts and kids, exhibited, and which are both very good of their class. S. and E. Hobson.—A very good exhibit of its class, being solid, good quality, well bred, and free from "kemp," and of good length. P. de Villiers.—Not a very desirable class of hair from a user's point of view, being somewhat coarse in quality, and though well bred and free from "kemp," some fleeces are the product of what is known as an "oily" goat, and consequently wasting or losing more in washing than ordinarily, and thereby reducing its commercial value. The hair is apparently grown in that part of the Karoo of the Cape Colony that is, in your judge's opinion, not entirely suitable for the growth of high grade or good quality Mohair, unless very great care is taken to eliminate from the flocks the older goats. Cawood Bros.—A very nice exhibit; both fleeces being good of their class; the hair is well bred and fully grown, but with a slight discolouration and a little "kemp"; the quality is good, and considering the district of the Cape Colony in which it is grown, quite a creditable exhibit.

Whilst regretting that there are, with one exception, no exhibits from other than the Cape Colony, and from the latter very few, your Judge has much pleasure in testifying to the exceptionally fine grade of some of the latter. With regard to Mr. O. Cawood's exhibit, nothing but good can be said, the same being a very superior type of hair, and such that your Judge can safely recommend as a model to others to breed up to, and he has therefore much pleasure in recommending the exhibit to your Committee for premier honours as being the best in the show. With regard to Mr. R. Cawood's exhibit, the hair in itself possesses all the good points of the above, but it is apparent to your Judge that the same was shorn under too favourable conditions, or under such conditions as are not generally obtainable by the average South African mohair growers; and this exhibit is therefore not bracketed by your Judge along with the above for premier honours, but could be safely recommended for a special prize or distinction if either of the latter be made. With regard to that shown by Messrs. S. and E. Hobson, this is a very fine exhibit of its class, being what is familiarly known in the trade as "Winter Kids," or the second shearing from the goat after birth, and inferior only in quality to what is called in the trade "Summer Kids." The exhibitors are to be congratulated on so good an exhibit. With regard to Cawood Bros., a good deal is to be said in its favour, as although a little inferior in breed and colour as compared with other exhibits before mentioned, it possesses an abundance or a combination of good length and good quality, and when the particular type of veld upon which it was grown is taken into account, Messrs. Cawood Bros. are to be commended for this very creditable exhibit. Generally speaking, the few exhibits are typical of and are the best of the principal grades or qualities that the mohair farmers of Cape Colony produce, and your Committee is to be congratulated on having got together exhibits which make up in quality what they lack in quantity.—GILBERT WATSON.

Fruit at the Products Exhibition—General Notes.

The Judges at the South African Products Exhibition in London offer the following remarks on the Fruit:—*Packing*: The packing is now becoming much more generally understood and may be said to be approaching perfection. Up to the present time wood-wool has proved to be the best packing material known. As wood-wool has to be imported, it might be desirable to make further small experimental shipments of fruit packed in other materials grown in the Colony, and more cheaply procurable. We would not recommend veld hay, lucerne or grass hay, as this would give a decided flavour to the fruit and likely to heat. Wheat straw being so sharp is liable to cause damage to the fruit, but barley straw, which has little or no flavour, with oat straw, may prove to be suitable, but it is extremely doubtful. Green paper shavings are very suitable. The fruits submitted to us were packed tightly in wood-wool to avoid bruising and damage through movement, the delicate varieties being wrapped in paper, which is a great advantage. Less air-space is allowed between boxes now than formerly, but from the state the fruits were found in when unpacked, this space is evidently sufficient; the boxes are more uniform in size, but those used by different growers are in many cases slightly different in depth, we think, if practicable, exact uniformity is desirable. In some instances the wood used in the boxes is too thin, as when the porters carry on their heads five or six boxes the pressure damages fruit in the lower box through the box boards being so thin. Pines are excepted in above remarks.

Trade Marks.—The introduction of Trade Marks for the various farms is a good idea. The description of the fruit, the trade mark, and the Gov-

ernment Inspector's Stamp should appear on the *end* of each box; some of the boxes were marked on the side with the name of the grower, and when packed closely together with the ends only showing, it was difficult to discover the contents. When large quantities arrive, this point is a most important one, as promptitude of handling is most essential.

Government Inspection.—The system of Government Inspection is an extremely valuable one, but it would be to the advantage of both growers and dealers if the fruits were graded, A. B. C. or X., XX., XXX., in each variety of each kind of fruit, instead of such varying terms being used as "Selected," "Extra Selected," "Picked" or "Superior." This Government grading is done in many instances of fruit from other countries, and dealers are generally prepared to buy accordingly without opening too many cases. But this selecting should not be carried too far. The number of gradings should not exceed at the outside three in any variety. Owing to the heavy freight which is the same for best goods as for inferior, it is advisable to ship best fruits and retain inferior for local consumption.

Cold Storage.—The effects of cold storage on the constitution of the fruits are gradually becoming more known and better understood, but as consignments of fruit from other parts of the world are sometimes sent over at a higher temperature than that adopted from South Africa, it would seem desirable that the Government should institute and subsidise experiments with a view to ascertaining the degrees of ripeness and the temperature of the fruit room for the different kinds of fruit and at different times of the year for them to arrive in the best possible condition in this country. As the fruit arrives nearer maturity so the regulation of temperature should be more closely studied.

Vegetables.—Those submitted were well grown in all cases, but it is in our opinion impossible for any trade to be carried on between South Africa and this country, except perhaps trade in an early new potato, as the cost of freight in most cases exceeds the price that the vegetables would fetch in the open market. The green vegetables were all of them blackened, and the crowns of the parsnips and other roots especially so, either by the frost or excessive chilling on the voyage. The carrots and onions arrived in good condition, but were somewhat badly graded Onions excellent in quality but a bit mixed. Onions and other vegetables would, we fear, only result in a loss if sent to this country.

Potatoes.—Potatoes might prove remunerative, but the variety sent is not suitable for this market. The faults were that they had tight skins, many eyes and were wrong colour. The requirements of the market on this side are : Potatoes, Kidney shape, thin skins which can be washed off, or even easily scraped with a knife, bright colour, off a light soil, medium size, 1½ inches to 2½ inches in length. Canary potatoes at present are making £8 to £11 per ton, and this price is expected to be maintained until the Jerseys arrive in large quantities in June. Should further information be required for particulars as to varieties, etc., etc, it should be applied for to the Trades Commissioner for the Colonies.

Pineapples.—The appearance of the Pineapples from Cape Colony is much against them, as size is small and colour, in many instances, bad and dull. Flesh, however, is of good flavour and fair consistency. Those received by the "Norman" were greatly inferior to those by the "Walmer Castle," and the reputation of the Cape Pines on the English market is likely to suffer considerably if the highest standard possible is not maintained in all consignments.

Grapes.—The Grapes arrived in good condition. They were well packed, but the bunches should have been sent with a bit longer stalk, and with about 2 inches of the laterals, if practicable. These improve their value and appearance. The berries were good flavour and well ripened, but were too much of a cluster, and consequently small and badly formed. They should have been well thinned as in the case of English hothouse and Spanish grapes. The size of the berries would thereby be increased, and the appreciation of value would more than compensate for the additional labour. Bunches of grapes packed with a thin sheet of tissue paper round each bunch are decidedly an improvement. It is most essential for them to be packed dry. Should a split grape be noticed, it should be carefully cut out.

Peaches.—The most suitable varieties yet exported from South Africa to England are undoubtedly the Alexandra as an early one, and the Royal George and Crimson Galande and Sea Eagle. These have arrived with fine colour and plenty of juice and flavour. The size also is good, and they should fetch top prices. The majority of others coming were poor colour, hard, little juice and little flavour. Even some of the so-called "Free Stone" peaches had these drawbacks.

Nectarines.—These were excellent, although hardly as juicy as the English glass house varieties, but they travel well. In our opinion they should be encouraged.

Peaches and Nectarines.—Both were greatly superior to those sent from California and the Argentine, and even many of the French. Colour is essential.

Apples.—Those received from Cape Colony have very little market value, and in nearly every case have been affected with the black spots. There is a good sale for best varieties, but present style of packing is a bit extravagant. We would suggest packing in large cases and wrapping the fruit separately in soft paper as is done with the Tasmanian, Australian and Californian.

Pears.—These seem likely to be the fruit above all others which will prove to be the best to encourage the shipment of. Special varieties we would mention are the Bon Chretien, the Marie Louise, the Bonne Louise, the Doyenne du Comice, and Rustenburg, or "Emile D'Huyst." They are splendidly marketable, and when ripe will keep for some time, and are therefore popular with the retail trade. Stewing pears might, if the proper varieties were sent, prove marketable to a limited extent. Catillac is a better variety than the Bon Cure.

Plums.—Kelsey Plums are very good indeed and arrived ripe and juicy. They are very popular, and meet with a ready sale. Apple Plums, however, run the Kelsey variety very close, and are also very marketable at good prices, and likely to increase in popularity as they become better known. Wickson Plums are not very marketable here and are only suitable for two or three early shipments.

Melons.—In the spring here Melons fetch high prices, providing they arrive in good condition, but the whiteness of the skin of the "Musk" Melons, so called by senders, was a bit against their sale, as they looked like common melons having little flavour, and it will take a while for the public to find out their excellence of flavour. Judges' opinions are divided as to the name and variety.

Water Melons.—Water Melons are a little too large for general commercial purposes, but there may be a market for a limited quantity.—(Signed by the Judges), A. HILLIER BROWN (of Hillier Brown and Dunn, Covent Garden, London), H. A. CHANTER (of Solomon and Chanter, Covent Garden, London), ALFRED DAVEY (Fruit Grower, of Bedford, England), W. P. LINDSAY FORBES (of Messrs. E. A. O'Kelly and Co., Covent Garden, London), HENRY LEVY (of Covent Garden, London), T. J. POUPART (of Covent Garden, London).

FARM AND VELD.

Gratis Distribution of Seeds.

With reference to the distribution of parcels, of seed gratis by the Agricultural Department to farmers wishing to introduce new crops or test new varieties, the Secretary for Agriculture desires that in future, so far as possible, this distribution may be carried out through the medium of the Agricultural Societies and Farmers and Fruit Growers Associations. To this end the secretaries of these bodies have been requested to bring to the notice of the members the desirability of their applications for seed being forwarded jointly through him to the Agricultural Department, Cape Town, when their requirements will be complied with and the seed forwarded to the various secretaries for distribution, all ready weighed out in bags for the individual recipients. It is hoped in this way to draw the attention of farmers more directly to the experiments in progress in their vicinity and so to derive the greatest possible benefit therefrom and stimulate the public interest in this promising line of Departmental activity.

Seeds Available for Distribution.

The following is a list of seeds actually in stock at the present time and available for distribution:—

Mealies: Early Yellow Canada, Wisconsin White Dent, Snow White Dent, Leaming, Thoroughbred White Flint, Pride of the North, Perfected Golden Beauty, Waterloo Extra Early, Brazilian, Pearl Popcorn.

Millets: Japan Barnyard, African Early Pearl, Siberian, Hungarian.

Sorghums: Planters' Friend, Nyouti, Manna.

Grasses: Paspalum, Rescue, Bushman, Hard Fescue, Kentucky Blue, Cocksfoot, Italian Rye.

Cowpeas: Whip-poor-will, Blue Hull, Brown-eye, White Lady, Clay, Gourd, Calico.

Cotton: American Rattler, Egyptian Mitafifi.

Vetches: Spring, Winter, Scotch Gore.

Clovers: Japan, Egyptian, Red.

Turnips, etc.: Improved Early, Fosterton Hybrid, Green Globe Imperial, Purple-Top Mammoth, Monarch Swede, Giant King Swede, Purple-Top Swede, Sugar Beet.

Mangolds: Orange Globe, Yellow Globe.

Rape: Essex, Winter, Summer.

Kale: Thousand-headed, Hardy Branching.

Lupins: White, Blue, Yellow.

Chicory: Short Brunswick, Magdeburg, Witloef.

Beans: Scotch Horse, Soy, Velvet; also Spanish Peanuts, Serradella, Sainfoin, Mustard, Linseed (flax), Saltbush.

Seeds under Order and Expected Shortly.

In addition to the above, the following seeds are under order and may shortly be expected:—

Mealies: Iowa Silver Mine, Sweet Fodder Corn, Cinquantino.

Millets: Japan Barnyard, Hungarian, Pearl, Japanese, Early Orange.

Sorghums: Undendibule Cane, Early Amber Cane, White Millo, Yellow Millo.

Grasses: Broomcorn, Yorkshire Fog (Holcus lanatus), Cocksfoot, Evergreen Rye Grass, Tall Fescue, Sheeps Fescue, Red Fescue, Chewings Fescue, Tall Oat, Rescue.

Lucerne: Turkestan, Tamworth.

Clovers: White, Alsyke, Red, Crimson.

Sulla: Spanish; also Sunflower, Buckwheat, Sheeps' Parsley, Saltbush.

Grasses: Directions for Sowing.

The following general directions for sowing grasses may be found useful to those trying them experimentally or who having discovered useful and suitable grasses are wishful to introduce them on a large scale. The ground is to be prepared as for wheat or oats, but repeatedly harrowed, if possible rolled and harrowed until a very much finer seed bed has been secured; firm below and loose on the surface. Preliminary cultivation for the purpose of causing weed seed to germinate and then killing it by harrowing is specially desirable as it is difficult to remove weeds from amongst the growing grass afterwards. Nurse crops of barley and rye may be sown thinly, but this is only required where shelter from severe cold or scorching sun is desired. The seed bed should only be got finally ready immediately before sowing. Sow the seed broadcast in two directions so as to ensure uniform distribution. Avoid sowing on a windy day. The seed must only be lightly covered, not deeply buried, and to do this a chain harrow is the best implement, failing which a bush or very light zig-zag harrow may be used for the purpose. It is an advantage to roll the ground to render it firm and compact round the sprouting seed. Mixtures of grasses may be sown at the rate of 30 to 40 lbs. of seed per acre—more where the seed is large or light, less where it is small or heavy. Experimental lots should be sown pure in order that no confusion may arise and at the following rates all per acre of 4,840 square yards:—

Italian Rye Grass	45 lbs.
Perennial Rye Grass...	45 ,,
Cocksfoot Grass	30 ,,
Rescue Grass	20 ,,
Timothy Grass	25 ,,

The season for sowing varies with the part of the Colony, but as a rule the commencement of the rainy season should be best and the danger of frost during the early stages must be avoided. The growth of grasses is improved by cutting, rolling and a reasonable amount of grazing. Special instructions are necessary in the case of the grass Paspalum dilatatum.

Paspalum dilatatum.

This grass will not answer if simply thrown out on the uncultivated veld and left to take its chance. It succeeds only exceptionally when sown out on land prepared as for ordinary grasses, and this method is only to be recommended with particularly good seed and under the most favourable conditions as regards seedbed soil and moisture. In such case 12 lbs.

per acre may be sown. The method found to answer best is the following: Sow the seed thickly on well-prepared seed beds as for onions or tobacco, covering lightly with sand or manure scattered on through a sieve. Water well before sowing and keep the seed bed moist. From 21 to 30 days are required for germination. The seed may be sown at any time from Spring to Autumn, according to the locality, preferably from August to October. Heat is essential. When the seedlings are a few inches high they may be planted out permanently, or otherwise pricked out in rows 3 feet wide, and 1 foot apart on good garden ground. A nursery is thus formed where in from six to nine months these plants, especially if irrigated, will form larger stools from which 20 to 30 or more slips may readily be obtained. Self sowing will also occur in this nursery which is more or less of a permanent character.

No great difficulties are presented in planting out paspalum whether from the seed bed or nursery. In existing grass camps it may be sufficient simply to notch holes with the spade, insert the slips and tread it firm in. If the land is ploughed the same practice or dibbling may be resorted to. Another plan is to lay the slips on the edge of the furrow slice while ploughing is proceeding, the succeeding turn of the plough buries the roots and leaves the tips projecting. This operation resembles the planting of potatoes, and it is well to roll the land after ploughing to firm it round the roots of the newly planted grass. Two feet apart each way is a suitable espacement for paspalum, at which distance about 11,000 plants per acre are required. Laborious as this process appears, it is undoubtedly the best means of establishing the grass, and is to be recommended to all who seriously propose growing paspalum.

A Three-Toed Ostrich Chick.

Mr. Frank Douglass, Kentucky, near Grahamstown, has recently sent to Professor Duerden, at the Rhodes University College, a newly hatched ostrich chick having three toes to each foot instead of the usual two. The middle toe is the longest and the other two, one on each side of it, are about equally developed. This abnormal condition is one of extreme interest from what is known of the development of the foot of the ostrich. Undoubtedly the ancestor of the ostrich, like that of other birds, had five toes, and Professor R. Broom, of Stellenbosch, has recently shown that the ostrich chick of eleven days' incubation actually possesses five toes; of these the first and fifth are very rudimentary, but the second, third, and fourth are well developed, the second least so. Under ordinary circumstances the first, second, and fifth toes disappear and only the third and fourth remain, the former being much larger than the latter and bearing the formidable claw. In the chick from Mr. Douglass it has happened that the second toe instead of disappearing as usual during the later development of the chick, has continued to grow at the same rate as the fourth toe. As is well known the American ostrich, the Rhea, is characterised by having the same three toes (the second, third, and fourth) in the adult, while the African ostrich has only two (the third and fourth).

The present chick forcibly illustrates a well-known biological principle, namely that of reversion or atavism, by which is understood the occasional striking back of an individual to some remote ancestor as regards any particular character. The most remote ancestors of the ostrich pro-

bably had five toes and its immediate ancestors three toes which could all be used. The Douglass chick is therefore, to be regarded as a reversion to this three-toed ancestor. It is well that the attention of ostrich farmers should be drawn to these facts, and Professor Duerden will be pleased to hear of any other bird showing similar characters in its toes.

"A Horse with plenty of Bone."

"Anxious Enquirer" writes from Basutoland:—"Would you kindly let me, and others, know the measurements below the knee for a given height, which are considered desirable to constitute a horse with plenty of bone, say, from 14 to 17 hands, also other measurements, such as girth, etc. Why do breeders of thoroughbreds mostly import horses that win mile races, or thereabouts? Surely, horses that have good records at two miles, and in steeplechases, and their progeny ought to be highly prized in South Africa to improve what is left of the South African horse. Most of the racers imported have thin bones. They may do for the relatively few racing stables, but the demand for the great majority of farmers is something very different. The regretted Dr. Hutcheon recommended the thoroughbred for general South African purposes. Is his idea to be carried out in the interest of the utility horse-breeder and consumer?"

There are no hard and fast rules as to measurement of bone below the knee. Quality has to be considered as well as size. A thoroughbred horse of, say, 16 hands, if possessed of eight inches of bone below the knee would be considered good. The accompanying photo is that of "Commoner," a thoroughbred horse, brown with black points, 6 years old, 16 hands high, and measures eight inches below the knee. This horse has just been purchased by the Hon. P. D. de Villiers, of Beaufort West, to mate with mares, the progeny of Hackney sires such as "Young Reality," "Kafir," "Dunhams Prince," "Matchless of Etton," etc., the produce of which should be useful saddle and harness horses. "Commoner" is by "Common" ex "La Ristore," and thus has the blood of "Isonomy" and "Melton" coursing in his viens. He is a symetrical horse (see illustration on another page) with flat clean bone, straight action, is a very fast trotter, and is of a most docile nature.—J.D B.

Grafted Vines at Tokai for 1908.

The following are the particulars of the varieties and numbers of vines grafted this season for sale by public auction at Tokai in July, 1908:—

Sultana on Metallica	50,000		
Sultana on Jacquez	10,000		
Sultana on Aramon	5,500	—	65,500
White Hanepoot on Jacquez...	83,000		
White Hanepoot on 1202 Hybrid	4,100	—	87,100
Red Hanepoot on Jacquez	55,500		
Red Hanepoot on 1202 Hybrid	2,700	—	58,200
Red Muscadel on Metallica	17,000		
Red Muscadel on Jacquez	30,000	—	47,000
White Muscadel on Jacquez	31,000		
White Muscadel on Metallica	10,500	—	41,500
White Green Grape on Aramon		—	24,000
Pedro Ximines on Metallica		—	5,500
Stein (Vaal Blaar) on Metallica	3,000		

Stein (Vaal Blaar) on Aramon	16,000		
Stein (Vaal Blaar) on Montpellier	12,500	—	31,500
Cabernet Sauvignon on Aramon		—	6,000
Black Prince on Metallica		—	25,000
White French on Metallica	21,000		
White French on Aramon	32,500	—	53,500
Raisin Blanc on Aramon	25,000		
Raisin Blanc on Metallica	25,000		
Raisin Blanc on Le Roux	3,500	—	53,500
Hermitage on Metallica	26,000		
Hermitage on Aramon	10,000	—	36,000
Barbarossa on Metallica	32,200		
Barbarossa on Aramon	10,000	—	42,200
Pontac on Jacquez	12,000		
Pontac on Du Lot	6,500	—	18,500
Waltham Cross on Metallica	1,500		
Waltham Cross on Jacquez	4,000	—	5,500
	Total of		600,500

With an average success from 50 to 60 per cent. of the above should be available for sale.

Coal for Suction Gas Plants.

Suction gas plants for pumping for irrigation purposes are attracting some attention in the Colony, and promise, in the course of time to play an important part in that work. The question of fuel is an important one and several enquiries have been addressed to the Director of Irrigation on that point. The only coal which can be used for this purpose is specially sized and washed anthracite and this can only be obtained in South Africa from Natal. The Zululand Collieries, Office 399, Smith Street, Durban, have recently put up a special washing and screening plant for supplying sized and washed anthracite for suction gas plants, and are prepared to supply the same in bags at the Cape Ports at about 30s. per ton of 2,240 lbs. in lots of not less than 20 tons. The Zululand Collieries are believed to be the only firm in South Africa who supply the washed article.

Sheep Shearing Machines.

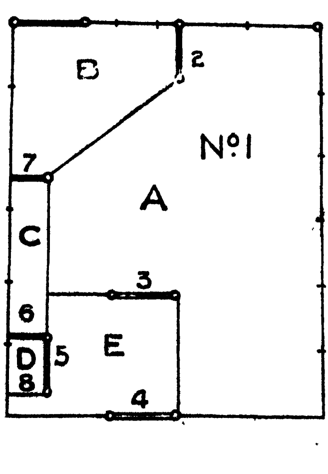
Several enquiries have been addressed to us lately as to the use of Sheep Shearing Machines, which have been so successfully adopted in Australia and other countries where large flocks have to be handled. The cause of the enquiries seems to be the scarcity of labour in some of the districts. In reply we can only state that the machine is better than hand shearing provided the user has had sufficient practice to give him expertness. But like all labour-saving devices to make it really economical, the conditions must be suited to its installation. First, it is necessary to have a shed properly fitted with shafting to which the driving gear can be attached and from which the shears are driven. The driving power can be supplied by hand or by an engine or motor as the needs may dictate. But it is more than doubtful if it would pay in a country like this to attempt to use an implement of this description unless very large flocks could be brought together to be shorn at the same time. The machine was developed in Australia where the costs of labour are very high; here, though such labour may sometimes be scarce, it is never very dear as compared with the rates demanded and received by the Europeans who do this kind of work in Australia.

Another point which would have to be considered by anyone intending to introduce machines of this kind would be that of training men to use the machine. This takes some time, for though it may be a comparatively easy matter for a man to learn how to use it, the time that it takes to make a man really expert in its use is something to take into account. One of our farmer readers tried one of these machines some time ago—procured, we believe, from Messrs. Malcomess, of East London—and he wrote us a very discouraging account of it. It is to be feared that he forgot to allow for the necessary experience. He was inclined to blame the machine, which was, of course, a mistake. Had he persevered he would probably have realised that it is a labour-saving device of some value, which, with a small flock, makes a man independent of the labour supply. An intelligent white man with mechanical tastes and the ambition to become his own shearer should soon become proficient with the machine if he stuck to it closely for awhile, but whether it will ever take the place of the hand shearer in this country is questionable—that is, until our flocks are much larger than they are at present.

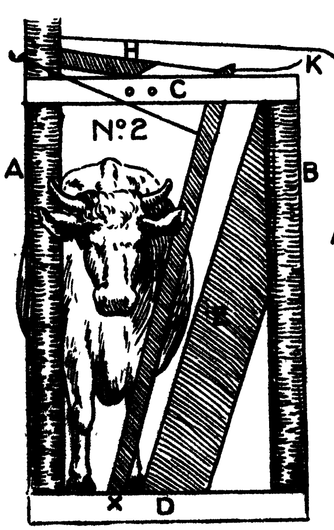
Yard Crush and Cattle Bail.

"J.A.H.," writing from Kenhardt, says: Some time since, I have been told, a drawing of an arrangement for catching cattle without throwing them, on the Australian plan, was published in the *Agricultural Journal.* Could you kindly give me the date.

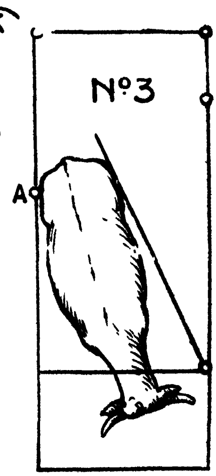
As it was sometime since this was published, we reproduce the particulars herewith. The principle is a good one, and was originally devised for spraying cows. For the ordinary handling of cattle, other than operations of such a nature, the bail, shown in figure 2, may be dispensed with, and slip rails substituted, provided posts are set so that the rails will catch the animal well up in front and close to the hindquarters. The yard shown can be constructed to suit circumstances, and is thus described:



YARD CRUSH AND BAIL.



THE BAIL.



It is about 50 ft. long and 40 ft. wide. A is the chief yard, and leads in by gate 2 to B, which is much smaller and triangular in shape. It is entered by gate (1), and leads by gate (7) to C, the crush, which should be made narrow, else the cattle will turn in it; and the posts in the fence on either side should have the edges smooth and not projecting too far, so that the cattle will not knock themselves about too much. The crush leads into D by the gate (6). The gates (7 and 6) should open towards the yard B, and when closed a stout bar of wood should be put on the side of B, so that if a cow runs back she will not knock the gate off its hinges. The bail yard D has the fence on the left side, a gate (6) behind, and one (5) on the right side, and the bail (8) at the end.

The bail is constructed on the plan shown in Fig. 2. The bail is formed by two stout posts, A and B, with a piece of timber (E), which strengthens and gives firmness to the bail, and at the same time prevents the cow from putting her head the wrong side of the movable post, which post is drawn by a cord (K), into an upright position, and firmly fixed by the piece of slotted timber (H). In this position the cow or other cattle cannot run round or go either backward or forward. The gate at this side of the bail can be used for holding the animal in place by pressing, as shown in Fig. 3. This gate is sometimes made with the upper section to open, so as to allow of free scope for the operator.

Gardening Notes for October.

During October many of the sorts of vegetables recommended for last month's planting may still be put in where the site and conditions are congenial for their Spring and Summer growth. No time should be lost in getting in potatoes, tubers and onion plants where the land would not admit of their being got in during September. Sweet potato runners should be put in, and succession crops of vegetable marrow, of the later sorts, also beans, beet and carrot. Early cauliflowers may be sown this month, care being taken to obtain the right sort of seed. These will be ready for planting out where the plot can be irrigated in December, and should be fit for marketing during March; but everything depends upon the soil and treatment of the crop as to whether you secure your much desired early market. Remember that this plant needs abundance of water and manure, and should never be allowed to stop growing until it is cut if the best results are to be looked for. They come best during the Winter months, when the weather is cool. If grown in Summer the leaves should be tied together, when they commence to head, to blanch them and prevent them getting bitter and brown from the effects of the sun.—E.P.

PNEUMO-ENTERITIS OR PASTEURELLA BOVIS.

A STOCK DISEASE OF THE EASTERN COASTAL DISTRICTS, SOMETIMES CONFOUNDED WITH LAMZIEKTE, OR OSTEOMALACIA.

By William Robertson, M.R.C.V.S., F.R.S.E., Director of the Veterinary Laboratory, Grahamstown.

Throughout Cape Colony, particularly in some of the Stock Breeding areas, reports of mortality amongst stock due to ailments for which no ascribable cause is forthcoming, are fairly common, and these, as it were, causeless diseases are given many and various names, in some cases two diseases being described under one cognomen. As an instance consider the disease Lamziekte. In many parts of the country a progressive paralysis due to defective nutrition and hence softening of the bones is meant by that term. Here in the Eastern Province a totally different disease with a totally different train of symptoms and *post-mortem* appearances is indicated when the term Lamziekte is used, and it is *this disease known in this area by that term which is the subject of this interim report.*

Of the first or original "Lamziekte" I have seen very little, and I take it that this form is universally acknowledged to be due to defective nutrition, viz., want of Phosphates in the food ration—and eventually in the skeleton—and can be treated preventively and curatively by the supply of this absent item.

Lamziekte (as known in this part of the Eastern Province),

is an erroneous and misleading title. If we were to describe it by its most prominent *post-mortem* lesions, we might with some justice give it the name of Pneumo-Enteritis, the lungs and digestive tract being the organs principally involved. This disease occurs in two types in cattle, an acute type, and a chronic or anæmic type. In the first case the death is sudden and the *post-mortem* lesion very marked and severe, in the second the symptoms and *post-mortem* appearances are those of anæmia, and death seems to occur from pure exhaustion and perhaps "Toxaemia." This cattle disease is not confined to the Eastern Province, but it is here only where a definite name is given to it. For the past four years I have met with cases of death in stock to which no cause (save that of poisoning) could be ascribed, the clinical symptoms and appearances of the animals were much alike, and the *post-mortem* lesions almost identical. The disease I am about to deal with occurs in cattle of all ages—(and can be transmitted from them by inoculation to sheep, this I will deal with under the

separate heading)—and I have met with cases on the Cape Flats, at Stellenbosch, in the City of Cape Town, and at suburbs between Salt River and Retreat, on the Cape Town-Wynberg line. Since my residence here I have seen cases in trek oxen in the yoke in this City, on neighbouring farms from the coast, inland and in my own cow in a yard at the rear of my residence. The disease is sudden in its onset. In one outbreak on the Cape Flats the cows went out well in the morning, one was noticed sick in the evening, and so on until five out of fourteen animals had succumbed. Here I have seen an ox pulling in a wagon, lie down in the yoke and never rise again. The general train of symptoms are, stupor, as if the animals were under the influence of some narcotic, eyes staring, diarrhœa (if animal lasts long enough) and a peculiar staggering gait with crossing or plaiting of the hind legs. The animal grunts and manifests symptoms of much abdominal pain, the conjunctival membrane becomes congested and almost blood red, and in a few hours after the first symptoms are noticed the animal will stagger into fences, trees, and sluits. Sometimes the ox drops at the commencement of the attack and remains persistently down until death supervenes, which, in the acute stage of the disease, takes place in from 24 hours to three days after the commencement of the attack. After death the carcass swells up extremely rapidly and exhales a most peculiar odour even before the body is cold, and frequently there is froth at the nostrils. On opening we generally find some fluid in the pleural cavity as well as in the abdominal, the lungs are frequently œdematous and full of fluid, and, even if the carcass and the blood fluid were quite warm, the viscera had a most disagreeable odour, approximating to that of necrosis. The muscles appear sodden as if soaked in some fluid, and the mesenteric and often subscapular lymphatic glands were much enlarged, frequently hæmorrhagic, generally congested; and often resembling liver substance in colour and consistency. The fourth stomach (abomasum) mucuous membrane was acutely inflamed in every case, and in many petechiæ, erosions (ulcers), and hæmorrhages were present. It was this lesion which in many cases made me suspect poison. The intestines and particularly the cæcum (big gut) are more or less congested, and purple black in colour. In this area I have during the past year met with thirty-three cases of this disease, and in all, the symptoms and *post-mortem* appearances approximate; I have met with it in oxen on the veld, and in the yoke, in cows in the stable, in calves, tollies, heifers, etc., and the percentage of recoveries is very small.

HISTORY OF THE DISEASE.

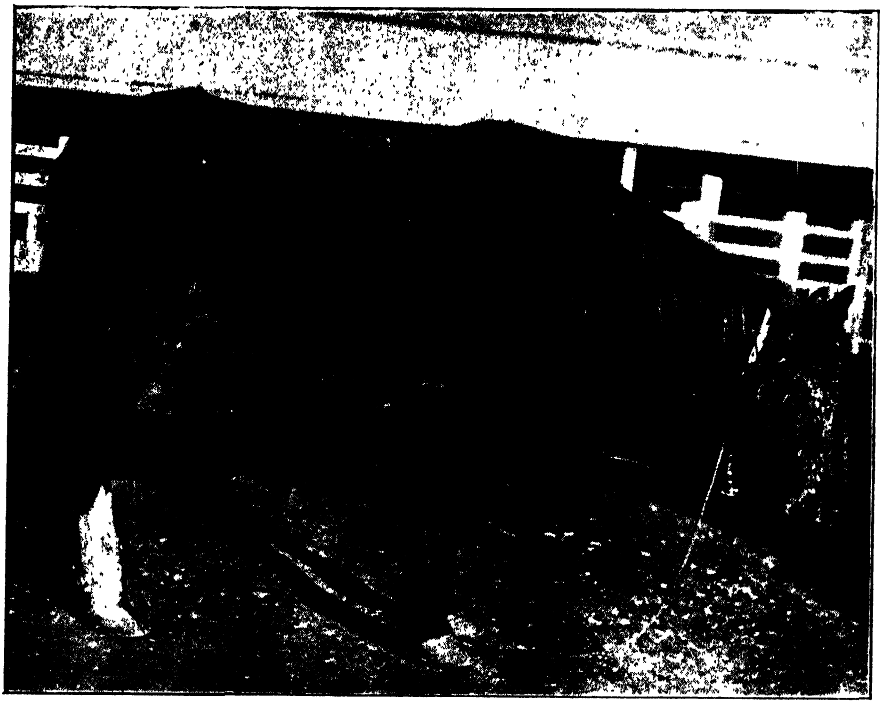
This disease seems to have been known for many years, and to be confined to certain farms (where during certain years some owners have lost as many as seventy head) and is the disease described by the farmers here as Lamziekte and, from his writings on the subject, was the disease described by Mr. Bowhill, F.R.C.V.S., as "Pasteurella Bovis." The disease may be acute, with death in a few hours, or chronic with death after a considerable period of anæmia and wasting, accompanied by diarrhœa, and symptoms of abdominal pain. I purpose dealing with the acute form first, and give a sample case.

The Acute Form.

Animal, a two-year-old fat shorthorn heifer running in an enclosed yard and hand fed. June 26th, first noticed sick; symptoms were, staggering and stiffness in hind limbs (this stiffness I find to be a most consistent symptom) rather off feed, pulse, respiration, dung, and temperature normal. Gave an aperient (mag. sulph. 1 lb.). June 27th: Animal much

PNEUMO-ENTERITIS OR PASTEURELLA BOVIS.

Attitudes adopted in cases of chronic supposed Lamziekte. The attitude of No. 2 might be called characteristic. The emaciation is well marked. This animal was sick 29 days.



Horse, showing attitude 20 minutes after inoculation with 3-weeks old Bouillon Culture.

Horse 10 minutes after inoculation with Bouillon Culture. Note the characteristic attitude similar to above.

1. Healthy sheep from flock, showing condition of animal worked with.
2. Sheep 10 days after subcutaneous inoculation with a Bouillion Culture from Mesenteric Glands of an ox in natural case of the disease.

worse, now staggers in gait and actually plaits the hind legs, eyes staring and amaurotic, conjunctiva injected and congested, respiration hurried, temperature normal. Purgative acted well. Animal seems completely stupid, walks against a post and blindly tries to walk through wire fence, etc. June 28th: Animal found dead at 7 a.m., quite warm, rigor mortis not yet set in; *post-mortem* was conducted at once. Carcass, fat, and in the best of condition. Viscera, though animal was warm and blood quite fluid, exhaled a most putrid odour with suggestion of the stench of stale urine; about four ounces of turbid fluid in the abdominal cavity. Rumen, recticulum and omasum (first three stomachs) were normal, the mucous membrane of the fourth stomach, or abomasum was of a deep purple colour almost the colour of a damson plum; any extravasations or petechiæ were quite masked under the general congestion. This congestion extended into the duodenum, getting slighter in the jejunum, and ileum, and increasing in severity in the caecum and colon. The mesenteric lymphatic glands were enlarged and congested to such an extent as to resemble pieces of liver. This is the description of a typical case of the disease, and the other cases of the acute form approximate very closely to this. I may again state here that any observer might be mistaken and diagnose both symptoms and *post-mortem* appearances to be the result of poison were it not that the number of similar cases under dissimilar conditions renders such a verdict impossible.

Chronic or Anæmic Form.—Sample Case.

A cow-keeper in this City had in November, 1906, seventeen calves born and bred on the place—a small holding on the side of a hill with two kraals at a lower level. These kraals were really vacant building lots, and above them were other kraals and back yards extending up the face of the hill The symptoms presented by the calves were most uncertain and indefinite At short intervals a calf went off its feed, wandered disconsolately around, became thinner and thinner, purged constantly and violently, the fæces having a most putrid odour. Seven calves became paralysed in the hind limbs, and in three cases the head was drawn back to the flank as in a cow with milk fever. Altogether twelve calves died, and all with a similar set of symptoms. The food was all that could be desired, mother's milk supplemented with green lucerne, bran, and a little oathay; water was from a stream, and the kraals were rather confined, but very clean. The *post-mortems* shewed great emaciation. One calf weighed 210 lbs when first taken sick, and the carcass after death did not scale 98 lbs. I have never seen such *post-mortems*: the muscles were almost white, flabby, and sodden with moisture; every bit of fat had disappeared, even the microscope and Sudan III (fat test) failed to reveal any traces of it in the mesenteries The pleural and peritoneal cavities contained fluid, the mesenteric glands were enlarged, not hæmorrhagic but extremely juicy, on section a turbid fluid exuded. The intestines were empty, and the mucous membrane of the fourth stomach was the colour of lead, that of the intestines the same; the small and large intestines contained a dirty greenish fluid evidently the result of subacute inflammation. The heart was pale and flabby, and the fat at the base replaced by fluid; the bone marrow was free from fat, and the joints contained an abnormal quantity of synovia. No affected calf ever recovered, though all the resources of the pharmacopeia were tried, in addition to the most careful nursing. I ordered the removal of the calves to another kraal much higher up the hill, and the mortality ceased. On all sides I hear and see of similar mortality amongst oxen and calves from acute or chronic form of this disease, and the combined mortality of the two must run into a big percentage of some farmer's stock.

The Cause.

From cases of the acute and chronic forms I have isolated a *Bacillus*, which I take to be the causal organisms of the disease. This organism is a short bacillus, polymorphic, easily isolated from the mesenteric glands of a case, and grows on the ordinary laboratory media at 37° C. It is *motile*, a *facultative anærobe*, and in stab culture evolves gas. All the cultures exhale the peculiar odour, before alluded to—that of necrosis and suggestion of stale urine. This odour is most characteristic and pervades the incubator and room where the work is being carried on.

(1) The organism is a very rapid grower.
(2) In Bouillion, renders liquid turbid.
(3) On slope agar a dense white growth.
(4) In stab agar, growth with evolution of gas.
(5) On serum, fair growth not so much as agar.

This is as far as I have carried it.

Inoculation Work.

100 c.c. of a thirty-six hours old culture injected intraveneously into a healthy young ox causes death in *twenty* hours with many of the clinical symptoms and an exaggerated set of the *post-mortem* legions met with in natural cases of the disease, and from this killed animal the same organism can be recovered. That is, it fulfils the postulates of Koch in regard to being the causal organism of the disease.

"It exists in the lesions in a natural case of the disease, and can be obtained from these and grown in artificial media outside the body. On inoculation it produces similar lesions, and from these the same organism can be recovered, cultivated in artificial media and produce fresh cases of the disease on inoculation."

Inoculation Experiment I.—Subject: A healthy two-year-old ox, fat, just received from Somerset East. Received 100 c.c. of a ·36 hours' bouillion culture intraveneously at 2 p.m. At 9 a.m. next morning the animal was down and dying. These were indications of commencing diarrhœa, but no other abnormal lessions; *post-mortem* took place at once. Blood not set and rigor mortis not present, slight discharge of semi-fluid fæces from rectum. On removing the skin, the subcutaneous tissue exhaled a peculiar odour, and presented a sodden appearance. Subscapular lymphatic glands were much enlarged, congested with small infarcts on surface and hæmorrhagic areas in the substance. The pleural cavity contained about a pint of clear straw-coloured fluid, the lungs themselves were full of the same fluid which followed the space between the lobules, giving the lung the veined appearance of a leaf (see photos attached). At the apices of the lungs there were some areas of atelectasis. Spleen enlarged and engorged with blood; if scraped with a knife the pulp can be removed from the trabeculæ. All the lymphatic glands in the mesenteries omenta and peritoneal cavity in general enlarged, inflamed, and congested. The first three stomachs normal, but the mucous membrane lining the fourth stomach was so congested as to be black in colour, the congestion commenced suddenly at the junction of the fourth stomach with the third and increased in severity the nearer to the pylorus; in that region, after washing, areas of discrete congestion could be made out, but these lesions were masked by the general congestion. Duodenum slightly congested, jejunum very much congested and filled with a fluid, the consistency of cream and

PNEUMO-ENTERITIS OR PASTEURELLA BOVIS.
Lung from Sheep, killed by intraveneous inoculation of culture from case of disease in Ox, showing the distention of inter-lobular spaces with straw-coloured oedema.

PNEUMO-ENTERITIS OR PASTEURELLA BOVIS.
Lung from Sheep, killed by intraveneous inoculation of culture from case of disease in Ox, showing the distention of inter-lobular spaces with straw-coloured oedema.

pale pink in colour. Cæcum much congested towards blind end. Colon inflamed generally and covered with crupous exudate. From this case I isolated the same organism, cultivated same and produced death with a similar *post-mortem* in other animals.

Subcutaneous Inoculation of the culture into oxen produces the chronic or anæmic type of the disease with death in from nine to thirty days.

Sheep.—Intraveneous inoculation into sheep in doses of 30 c.c. produces death in 12 to 24 hours with fluid in chest cavity, great œdema of lungs, enlargement and congestion of lymphatic glands and acute inflammation of the mucous membrane lining the fourth stomach. Subcutaneous inoculation of 20 c.c. bouillion culture produces rapid emaciation and anæmia. A sheep can lose 2 lbs. a day and die from marasmus in about three weeks (see photo). From the lesions in the sheep I have recovered the organism, cultivated same and produced the disease in other sheep. I have carried the organism through four sheep and think it is exalted in virulence and through seven culture removes without noting any attenuation. So far I have been unable to produce the disease in the ox with cultures passed through sheep. This may be due to many factors.

Horse.—An aged healthy grey horse was inoculated intraveneously with 100 c.c. bouillion culture (three weeks old) at 4 p.m. on the 30th July, within *three* minutes of inoculation the animal became distressed, breathing became laboured and lay down, commenced to heave at the flank, and after a few convulsive coughs about four ounces of frothing blood appeared at the nostrils. Between the time animal lay down and forty-three minutes afterwards the horse defecated seven times, the last two motions being quite fluid, the breathing became more laboured and the animal died quietly at 5 p.m. *Post-mortem* at once. A rupture of the left lobe of the lung nearly four inches in length, with much clotted blood and froth in the chest cavity. Lungs spotted with patches of blood which has been sucked down the bronchi. Spleen much engorged with blood and the wall of the small bowel thickened with an exudate. I have killed two horses, and both presented similar symptoms. Inoculation of a third horse with a seven days old culture, produced distressed breathing for three hours and much heaving at the flanks. This passed off in seven hours, and the animal successfully resisted two inoculations of a similar culture which killed two horses

These few notes on my work so far fragmentary and incomplete open out a field of work of great interest and vast magnitude. The questions which at present themselves to us are, how is infection carried? where does the animal pick it up? and how far is it communicable in nature between the ox and sheep and *vice versa?* I am inclined to the opinion that the source of infection is the water supply, but this subject is under investigation. So far curative treatment has proved absolutely useless. The photos accompanying this article shew the Lung of a Sheep, a case produced by inoculation. Unfortunately monochrome work does not shew the clear fluid network exactly resembling a case of horse sickness. A chronic case compared with a healthy sheep. A natural chronic case in a calf, shewing the attitudes assumed by the sick animal, the head to flank attitude is almost characteristic, the great anæmia and distressed look are well shewn. The appearance presented by a horse after intraveneous inoculation with a culture.

Resume of Work.

1. The disease known here as Lamziekte differs in its entirety from that affection of cattle demonstrated to be due to deficient balanced food ratio.

2. This disease is responsible for the death of an immense number of cattle at certain farms, at certain seasons and at certain cycles (that is, periods of years).

3. The disease is due to a Bacillus which can be isolated from the affected tissues and on inoculation can produce the disease in oxen and sheep.

4. The disease in the sheep would appear to be similar to that in the ox, as the cultures are indistinguishable in morphological and microscopical appearances and experimental reaction.

5. The disease requires extensive investigation, its presence in sheep as well as cattle gives us the cue to many outbreaks of anæmia amongst sheep ascribed to parasites (or their previous action, when none can be demonstrated on *post-mortem*).

6. This is, I think, the disease described by Nocard and Leclinche as "Pasteurellose du Bœuf et du Mouton" in Vol I. of their "Les Maladies Microbieum des Animaux;" by Ligniere, in the Argentine, as Enteque in Calves and Lombriz in sheep, and by Bowhill, as Pasteurella.

I have simply touched on the fringe of my work on the subject, but enough, I trust, to shew the importance and interest attaching to the disease.

POSSIBLE EXPORT OF CAPE WINES.

REPORT ON THE CAPE WINE TRADE BY THE TRADES COMMISSIONER.

I have the honour to report that since my arrival in this country as Trades Commissioner I have devoted considerable time and trouble to enquiries and investigations in connection with the very important question of placing Cape wines on the English market. I am at present not in a position, and I do not suppose that I ever will be able, to enter into the technicalities and the qualities and values of wines in this country; but I will now only deal with the general commercial aspect of the question, upon which point I have gained a great deal of information, which I think will prove of value to those in Cape Colony interested in the wine trade.

As to the qualities and values, you will find these subjects fully dealt with in a clear and lucid report made by the three judges upon the wines submitted to them at the recent South African Products Exhibition, of which I enclose a copy herewith. These gentlemen are recognised in the trade as being amongst the most capable and able men to advise on the question, and the thanks of the Cape Government is due to them for their valuable services freely rendered in this matter.

The Exhibition.

The effects of the Exhibition on the wine trade have been that great interest has been created, and that an excellent advertisement was given to Cape wines. Four of the leading firms were represented by agents, who were constantly in attendance, and every facility, both for showing and tasting, was granted by the Exhibition Committee. Large numbers who had not formerly known Cape wines had the opportunity of tasting them, and a considerable number of orders were taken. I estimate that orders for 500 cases were placed at the Exhibition or immediately afterwards. The majority of the wine merchants represented had very little stock in this country to execute orders, so the bulk of orders had to be executed from Cape Town. I am, however, of opinion that a considerable number of the orders were given for the following reasons—some by persons out of curiosity, some by people (who had lived or were interested in the Cape) for old associations' sake, and a small number of people in the wine trade ordered cases for experiment. I will, however, say that there were some orders given by persons who liked the flavour of Cape wines. I don't think, however, that this has had any permanent effect on the trade, and the sales do not in any way prove that Cape wines are acceptable to the London market. Unless other methods are adopted for the distribution of the wines there will be no demand here for a large quantity of Cape wines.

Labels and Get-up.

The labels, capsules and general get-up of the wines exhibited left nothing to be desired, and were spoken well of by the public.

The Naming of the Wines.

When the list of wines forwarded for exhibition by different exporters was submitted to me, I was immediately struck with the large number of different names selected by the wine merchants for their different types of wines. I found that in eight classes of wine no less than 63 different names were used to describe the 86 samples. In brandies 14 names were used for 14 samples. From a trade point of view, this plethora of names is certainly a great mistake. If money is to be spent in making the wines known on the English market, it would require relatively more money and time to make the public acquainted with such a large number of names than what it would cost if a lesser number of names were adopted.

I have consulted a great many people who are competent to express an opinion on this matter, and they strongly advise that the wine merchants should agree on certain names for certain wines of each type; that is to say, the wine merchants should agree upon a certain name for a certain type of wine, and that name should be adopted by all of them, leaving it to their discretion to adopt what label they suggest; but it is very important that different types of Cape wine should be recognised by one name, independent of the name of the bottler or the brand.

I enclose herewith a list of the names of the wines submitted to the judges, from which you will see that the names were not always suitable, and in most cases conveyed no idea to the consumer as to what the contents of the bottles were; for instance, it is very probable that a wine called "Rynette" bottled by one firm may be the same as "Cape Hermitage" bottled by another, or "Springbok" sold by a third, or "Vanderstel" sold by a fourth. I may mention these names as they were all placed in one class for purposes of judging at the recent Exhibition.

Brandies.

You will notice in the judge's report that they express themselves very unfavourably on the subject of Cape brandies. This is probably due to the fact that the taste of Cape brandy is quite unknown to the English palate, and I agree with them that at present there is little chance of its having a market here.

Van der Hum.

With reference to Van der Hum, I am pleased to be able to report that from information gathered by me there seems to be every possibility of a considerable demand being created for this liqueur in England. Almost all persons who have tasted it seem to like the flavour and have expressed themselves well pleased with it. To create a market for Van der Hum it would be very necessary to carefully study the whole commercial bearing; a large amount of money would have to be spent, especially in public advertising and for the distribution of samples.

A special and attractive form of bottling will have to be adopted, and uniformity of colour and quality will have to be agreed upon by the manufacturers, and other matters of this nature will have to be studied to comply with the tastes and requirements of the English market.

Wines for Blending Purposes.

I have received communications from Wine Merchants together with raw samples for blending purposes. I commenced my enquiries in connection with this subject, but found it a most intricate and delicate matter to form an opinion on, but I am continuing my enquiries on this point.

Upon enquiry I find that light wines are being more drunk than heavy wines, and the enquiry for white wines, such as Hocks, is increasing.

Comparative Prices and Quality

The comparison of the prices of Cape, Californian and other wines is a question of the greatest importance, and it is purely a question of taste. I have taken the opinion of the people in the trade and of a considerable number of private gentlemen, and the general impression left on my mind is that Cape wines taken at their present prices are not equal to competing wines at similar prices. I think, however, that this question could be easily and more satisfactorily decided by wine merchants and wine producers in South Africa, and for that purpose I have purchased samples which have been forwarded with retail price lists, and submitted to people in the wine trade at Cape Town

The Economic Methods of Shipment.

Upon enquiry I find that for many years certain agents for wine merchants at the Cape have been importing their wines into this country in the wood, and I have the assurance of one agent who states that he has for fourteen years been dealing in Cape wine, and he has only imported in the wood and that it makes no difference to the quality of the wine. Some of the other agents for Cape wines are also importing portions of their stocks in wood. I find, however, that some other merchants do not altogether agree that this is the best method to adopt, but I think the wine merchants at Cape Town are better able to express an opinion on this subject than I can.

I am informed that the cost of importing a gallon of Cape wine in wood would amount to about 5s. in comparison with 7s. 3d. in bottles This does not include the cost of the wine, but would cover all the expenses of freight, duty, agency, etc , from the wine store in Cape Town to the depôt in London. My informant tells me that these prices can, however, be much reduced in the event of large shipments

The Question of Marketing.

After carefully going into all the questions connected with the important subject of finding a market in this country, and having had numerous consultations and interviews with different persons in the trade, I have come to the conclusion that wine merchants or wine manufacturers in South Africa have to face the following three important questions as far as the over-sea market is concerned:—

1. Quality of the wines.
2. Prices of the wines,
3. —and this is the most important of all—the economic question of placing the wines on the market.

Personally, I must refrain from expressing an opinion as to the questions of quality and prices; these are purely matters for the decision of

those in the trade in the Cape Colony. It is for them to decide whether they could make better wine at a cheaper price if a large market were put at their disposal. Even if wine producers in South Africa could produce wines of as good quality and at a price to enable them to compete on the English market, they would still have to face the great question of distribution; that is, the placing of their wines in large quantities on this market. If this has been a great question in South Africa, it is certainly also a great question in England. Nobody in South Africa understands these difficulties better than the wine merchants themselves. It is probably well known to all of them that the channels of distribution are controlled by persons who have spent fortunes in advertising this trade, and they would naturally expect to be well compensated if their assistance were required in the distribution of Cape wines. It is also well known that enormous sums of money have been and are being spent on advertising competing wines on the English market from foreign countries and from other Colonies.

I am credibly informed that one firm of wine merchants distributing from one of the British Colonies is spending from £15,000 to £20,000 per annum on advertising and publicity. There are also other large firms spending huge sums every year in the same manner, but it is said that these amounts are well spent and an enormous trade has been developed.

Though I am reluctant to commit myself to a definite opinion on the very important question of distributing Cape wines on the English market, I have come to the conclusion that unless the wine merchants and wine producers of Cape Colony are prepared to adopt the methods of distribution which have unfortunately become the custom of the trade, that is, to spend large sums of money on publicity and "push," there will be little chance for Cape wines to find a place on the English markets at present in large quantities.

I quite recognise the difficulties in the way of this policy. In the first place, I do not think that any individual firm of wine dealers or producers in the Colony is prepared to venture large sums of money for this purpose. Secondly, should any firm entertain such an idea, it would have to consider to what extent any rival firm of wine merchants at the Cape would take advantage of its success after they have created a demand for Cape wines, even if they were protected by trade mark or brand. However, one of the only courses open, as far as I can see, is for those interested in the Cape wine trade in England is to consider the advisability of forming themselves into an association or co-operation, in so far only as the export trade is concerned, with a view of placing their produce on the English market.

I would, therefore, ask you, in view of the condition of affairs as disclosed in this report, to call together those interested in the wine trade and its production, to consider this important question. I do not suggest that they should adopt this course, nor do I recommend its adoption, as I cannot advise them at present upon the details of the scheme, nor upon the risks contingent thereon; but by means of co-operation the expenditure and risk would be divided up amongst a greater number, and when the object is attained there would be a sufficient market to take the products of those interested in the export wine trade.

Should these gentlemen be prepared to consider the question of a co-operation, they would have to provide a cash capital of about £20,000 to carry out their object. Of this sum, at least £10,000 to £12,000 would have to be spent during the first year in advertising, and a considerable part of the balance would have to be spent in stores, bottling appliances, question of stocks for free distribution and for tasting purposes. The question of stocks for sales in the London depôt could be better decided by the merchants themselves.

Without entering into details, I should advise the management of the co-operation to select two or three varieties of wines in each of about four classes and to prepare themselves to supply large quantities of those classes only, and to devote their energies and capital in giving publicity and pushing these varieties only by all modern and recognised methods of advertising.

RE SUPPLY OF WINE IN BULK.

Apart from the method of distribution referred to above, there is perhaps one other means by which Cape wines could be placed on the market, that is, to offer it for sale in large quantities shipped in wood, to persons or firms in the trade here, who would be prepared at their own expense to advertise and create a demand; but if this could be done, these persons would first require that the wines be placed in their hands at a very low price, and secondly, they may also demand a subsidy from the Government or the wine merchants, and further, in this case, Cape wines will have to enter into very close competition with wines from other parts sent over in bulk.

It is, however, not improbable that arrangements of this sort might be carried out, and that strong persons in the trade, who have already acquired to a considerable extent the means of distribution, might be induced to take up the question of distribution of Cape wines. The whole question (after they have satisfied themselves as to the qualities of the wines) will be the question of price and the amount and nature of the subsidy.

Of course, Cape wine will also find a small market in England as much as it has hitherto done amongst the few who buy it, partly for its associations, partly as a novelty, and also because they have found that it agrees with their taste; but this trade under the present methods of working is always bound to be limited.—I have, etc.,

C. DU P. CHIAPPINI,
Trades Commissioner.

98, Victoria Street,
Westminster, S.W., May 22, 1907.

EXPERIMENT STATION REPORTS.

By Eric A. Nobbs, Ph D., B.Sc., Agricultural Assistant.

Introductory.

One of the chief difficulties to be met in the establishment of Agricultural Experiment Stations lies in the fact that this Colony is divided up into a number of regions totally different in their character and each clearly marked by more or less abrupt natural boundaries. Karoo, grassveld and sour coastal bushveld are three main classes, but these again may be subdivided, according, chiefly, to altitude, rainfall and the time of year of the rains, into numerous zones or areas each with its own peculiarities, advantages, drawbacks, and consequent problems. It is for this reason that it was decided not to establish one large, central experimental farm, supplied with all the latest aids to scientific research, such as characterise the American institutions, but rather to have a number of smaller stations concerned with the immediate pressing problems of the day, in closest touch with the farmers of their districts and working along practical lines.

While the aim of an experiment station is the acquisition of reliable data for general application, yet it is obvious that the conclusions arrived at are, strictly speaking, only exactly applicable to the particular spot upon which the experiments were carried out, as in no two places do precisely the same sets of natural conditions obtain. The differences of soil, situation, and climate must be borne in mind when applying results obtained at the experiment station to the circumstances of any individual farm. Common sense alone can guide here.

General truths may be deduced from results obtained at Robertson and applied largely to the whole of our semi-arid Karoo districts with a rainfall of about ten or twelve inches more particularly to the region of winter rainfall; the results are yet more precisely applicable to the region of the Klein Karoo, especially to the Breede River Valley, and there to the red sandy Karoo soils. Similarly the experiment station at Edinburgh, Knysna, serves for the study, in their extremest form, of the problems connected with the sour veld, and will be of assistance to those having to do with such country, more especially along our coast belt, and there in the region of abundant rains, while the information derived from this experiment station may be regarded as specially of interest in the forest zone.

In the selection of these two sites it will thus be seen that we have secured extreme cases of irrigable land in a fertile but dry Karoo region, and of a very poor soil in sour veld with an abundant rainfall. This was intentional with a view to enabling the study of two very distinct and important types of country to be proceeded with.

The work now in hand largely consists of the commencement of a number of enquiries, unavoidably complex at first, but gradually becoming simplified by processes of exclusion and selection.

Any such lines of enquiry have to be pursued by a series of successive inductive steps beginning at very primitive investigations. As there is little or no previous experience and no data available, the work has to be commenced *ab initio*.

The acquisition of facts in such a case is necessarily a tedious operation, and each conclusion arrived at must be tested and confirmed by repeated trial. Hence the results of the first few years cannot pretend at once to throw much light or to lead to striking discoveries; only by persistent effort and much patience are the secrets of nature to be unfolded

In some instances no report can yet be issued, but an endeavour has been made as far as possible to carry out experiments that shall have immediate practical utility.

It is necessary at the outset clearly to explain the nature of the results secured and the extent to which they may be applied to practise. From what has been said, it will readily be understood that the result of each separate experiment must only be regarded as of itself fragmentary and subject to correction. When several trials have been made and the same results repeatedly obtained, then a greater degree of confidence may be reposed in the conclusions arrived at.

Meantime it is a case of feeling the way, and the results given must be regarded as more or less tentative This year's work is but a first approximation to the truth. As is always the case with statistical information, it is not individual facts, but their iteration and confirmation that enables generalisations amounting to natural laws to be enunciated. Having given this warning once, it will not be necessary to repeat it when expressing the conclusions of the experiments individually.

Such being the general position, it will be instructive to describe briefly the precise circumstances of each experiment station in order that the conditions surrounding the experiments may be more easily comprehended, and that the circumstances may be compared by the reader to his own, and their applicability to his needs gauged.

THE EXPERIMENT STATION AT EDINBURGH, KNYSNA.

PRELIMINARY STATEMENT.

In commencing a series of reports upon the work of the Agricultural Experiment Station at Knysna, it is necessary to offer some explanation of the intention of the institution and the selection of the particular site chosen.

Besides the forests the district of the Knysna includes a wide extent of open veld. Sour veld is one of the leading types of country met with throughout Cape Colony, and arable farming is largely but not very profitably followed in such regions. The pasture of the Knysna district is notoriously an acute case of sour veld, of which the land occupied by the

station is a typical example. Incidentally it is centrally situated and cannot be criticised on the score of fertility or any other unduly favourable circumstance.

Any crop which succeeds on that impoverished soil, or any process which commends itself under these unfavourable circumstances may be relied upon to succeed at least as well, and usually better, anywhere throughout the coastal sour veld and in the region of heavy rainfall.

The problem of finding profitable occupation on the land for the bush-cutter classes demands earnest consideration and study. The resources of the forests are dwindling rapidly, while the numbers of the bushcutters continually increases. At present the actual workers number some 1,400 men and boys, while with their families and dependants they number about 5,000 souls.

Everything points to a time, not far distant, when the population will be forced to seek means of subsistence other than that of hewing wood, and as yet it does not appear where they are to find remunerative employment. The sooner some form of agricultural industry can be established and farming made sufficiently remunerative to attract even a portion of the labour away from the forest, the longer will the timber stock hold out, and the less acutely will the inevitable transition be felt from the one pursuit to another. The need of ascertaining the most profitable use to which the soil, such as it is, may be put, becomes apparent. The desirability of information on this all-important subject came to be realised, and the establishment of an experiment station having been proposed, a number of gentlemen of Knysna attested their approval by subscribing towards the cost of maintenance for the first three years. A two-fold object is served by the Experiment Station at Edinburgh, Knysna. Firstly, opportunity is afforded for systematic enquiry into the best means of utilising agriculturally the available open land in the district. Secondly, but more generally, the problem of the future of the bushcutter, a phase of the larger question of the poor white and his employment in rural industry, receives attention, though necessarily by the indirect process of studying the agricultural possibilities of the region.

The work being carried on at the Knysna Experiment Station may be defined as the study of the problems of sour veld farming, and operations have been in progress for upwards of a year. It is proposed to investigate the conditions which combine to create what is known as sour veld, its causes and inherent properties. The aim of such enquiries is to find a means of combatting the drawbacks and disadvantages, and to make the most of the natural merits of such soils, and of determining the most appropriate methods of farming the land. Suggestions readily present themselves, such as the improvement of the pasturage, the introduction of new crops, or better methods in producing the usual ones, processes for maintaining or increasing the fertility of the soil, and the development of new industries in connection therewith. In all such efforts the needs and proclivities of the local rural population have to be borne in mind.

Chemical examination will prove the relative sterily of the soil, and manurial experiments tried as yet on a limited scale bear this fully out. Such plant food as may be present seems also to be in an insoluble or unavailable form, for fertility is known to increase and the soils to be sweetened by being broken up with the plough. This fact is a great drawback economically, as it reduces the prospects of getting a good crop from new ground and a quick return of money such as may be had by the sale of a load of timber. This difficulty of securing a good return in the newly ploughed land hinders the small farmer, especially the beginner, and underlies much of the present distaste for farming. In the past it has

proved one of the chief stumbling blocks of the many ill-fated immigrants' locations and settlement schemes. The inhabitants had to live on capital until their land could support them. As it took years to get a paying crop, these efforts ultimately all failed, causing in consequence much suffering and distress.

The qualities implied in the term sourness of veld are somewhat hard to define or enumerate. With acidity as such it has nothing necessarily to do. Often, but by no means always, does the soil supporting such "sour" herbage contain an excess of raw humus, vegetable matter not sufficiently decomposed to be again available as plant food, and possessing strong acid and astringent properties subversive to the growth of plants, especially such delicate ones as those grown by man and regarded as crops. Sour veld indicates poor soil, but poverty of chemical ingredients does not imply sour veld Excess of moisture is a potent cause of sourness, yet sweet veld areas occur in regions of heavy rainfall, even in Knysna itself on richer soils, particularly on such as contain a fair proportion of lime. The addition of lime, while helpful, will not alone convert sour into sweet veld. The unfavourable conditions which go to develop sour veld, the chemical poverty and absence of lime, the accumulation of raw humus, the too abundant rain, all combine to favour those botanical forms which we know as sour veld.

Of such vegetation the constant and most striking property is an excess of woody fibre in the tissues rendering the grazing when dry harsh and indigestible, and when succulent weak, innutritious and unsatisfying. These distinctive properties of sour as against sweet veld are due primarily to lack of chemical ingredients in the soil, and hence of nourishment in the crops and pasture, and secondly to the climatic conditions which have favoured a flora (1) of luxuriant growth, hence woody; (2) inexacting in its requirements except for moisture, hence poor as a diet; and (3) durable, hence tough The grasses which grow rank and green have little feeding value, reeds and sedges occupy much of the surface, heaths, bracken and the sugar bush family (*proteaceæ*) predominate. The grasses are short, inconspicuous, and grow only where bush is absent Scrubby bushes from two to ten feet high cover much of the surface, while the prominent feature of the landscape is the forest, or what remains of it, for it was once much more widely spread than is to-day the case. Stretches of level or gently undulating open land lying waste and unoccupied testify to present unsuitability of the land for agricultural crops The bulk of arable farming is restricted to patches of cleared forest land, to alluvial stretches by the rivers and the sweet tracts along the coast, none very extensive areas. Against the unfavourable factors of the locality there are to be placed certain advantageous characteristics which would materially aid arable farming were the contrary elements once overcome. Where bush is absent or when once the bush is cleared and the roots decomposed the mechanical nature of the soil is excellent, deep, porous, friable, soft, free from rock, and easily worked by all implements.

The conditions which combine to produce sour veld no doubt materially influence the nature of the fermentative processes of the soil, the minute and lower flora, as well as the conspicuous and higher orders of the vegetable world. Both, in order to render the land fertile and productive, must be altered. Before payable crops can be grown a changed bacterial condition must be induced in the soil itself. This is to be brought about by aeration, tillage, and manuring, and requires time for the growth and propagation of the desired micro-organisms whose united efforts we term mellowing or sweetening.

In studying the question of farming in the sour veld the cause and the remedy of the evil may be considered together. By becom-

ing acquainted with its characteristics and causes we may reasonably expect to find the key to the means for ameliorating its condition. To this end a series of experiments (Class I.) has been devised, in which the primeval sour veld is dealt with, under carefully controlled and observed conditions, with a view to learning what it is that comprises the process known as sweetening, mellowing, or taming such land and at the same time of settling the practical question of the cheapest and most effectual manner of so doing. A remedy for this barren state of the land has to be found. There are three separate means at our disposal for rendering farms reproductive: cropping, manuring, and tillage. The practical question is to ascertain the cheapest and most effectual manner of so doing, as ultimate success will, no doubt, be found along these lines.

The first process is that of ascertaining what crops can with the means at our disposal be successfully grown in these soils. The present choice is wonderfully small, and there can be little reason to doubt but that along this line of inquiry there will be much learnt in the course of the next few years. Very promising results in this direction have already been attained. The second means at our disposal is that of enriching the land by the use of artificial manures and guano. This matter is more complicated than to the uniniated it at first sight appears, but even on the limited scale upon which these experiments have hitherto been possible striking results have been achieved, and during the coming season a more elaborate series of trials will be conducted.

Finally the process of sweetening or mellowing the soil is dependant ultimately on the method of tillage employed, and this being essentially a process of time we are still only at the threshold of our investigations.

Such are in brief the circumstances and aims of the Experiment Station in the Knysna. The spot chosen for the work lies on the main road about six miles to the east of the town of Knysna, and consists of a representative bit of rough sour veld, for the most part unimproved. One portion was cropped some twenty or thirty years ago, and a few scattered cottage gardens existed at the outset, but the bulk of the land has never been tilled, though occasionally burnt off by veld fires for the sake of the grazing. It is an exceedingly sour piece and rightly regarded as very poor. Previ us to the experimental work being undertaken the opinion was freely expressed that anything which answered here would certainly do well anywhere in the district. That was precisely what was wanted for the object in view.

Suitable buildings of wood and iron have been erected in a central situation; the necessary implements, stock, fertilisers, and seed provided, most of the land fenced off, and the place put into working order.

The following is a brief summary of the experiments now in progress, reports on which will be published in future issues: —

I. Veld Improvement.—By burning, cultivating, grubbing bush, and by the application of manures.

II. Crops.—Trials of indigenous and foreign grasses, of varieties of ordinary crops, and the introduction of new crops.

III. Cultural Methods.—Trials of different processes with all the crops ordinarily cultivated.

IV. Manurial experiments on all crops.

V. Experiments in the introduction of rotations.

The results obtained will, it is hoped, eventually lead to the profitable utilisation of land now lying idle, and thereby to the agricultural development of the district.

THE AGRICULTURAL EXPERIMENT STATION, ROBERTSON.

PRELIMINARY STATEMENT.

Soils.

The nature of the problems to be studied at the Robertson Experiment Station are essentially those of irrigable Karoo soil in the arid and semi-arid portions of the Colony. With a cold winter season, during which most of the rain occurs, and a warm summer with a deficient rainfall, a somewhat precarious water supply and a sandy Karoo soil, the district of Robertson possesses the same characteristics and difficulties that occur over a very wide area in the Colony. Robertson is one of the most rapidly advancing parts with a relatively dense population, and as typical of this class of country as any one place can be. A proof of its suitability for the objects in view is that visitors from all parts, including the neighbouring Colonies, visit Robertson for the purpose of examining at first hand the irrigation system in use and the methods of farming in vogue there. The soil of the valley, as is natural in such alluvial deposits, varies from place to place. That at the Experiment Station is of three slightly different sorts. These have for reference been denoted A, B, and C, and are being both chemically and mechanically examined in the Government laboratories. As this is one of the most exhaustive analyses yet performed upon a Colonial soil, the results when completed will prove of exceptional interest, and will be of the utmost assistance towards the proper elucidation and comprehension of the problems of the station, particularly of those connected with the use of fertilisers, the economic application of water, and the question of brak, all three matters of vital interest to South African agriculture. So far, only the general chemical analyses of the three types of soil are available, and are as follows:—

CHEMICAL ANALYSES OF ROBERTSON SOILS.

Soil.	Percentage in soil sifted through 1 mm. sieve.				Percentage in soil sifted through ½ mm sieve. Extracted by standard method.		
	Moisture.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
A	·97	2·59	·0184	·084	·207	·095	·036
B	·95	2·98	·0099	·070	·276	·091	·033
C	1·97	4·72	·0248	·154	·461	·179	·042

The first (A) is a light sandy loam, red in colour, with a tendency to become brak, and absorbing a large amount of water. When wet it is soft, as if melted, and requires careful handling to prevent erosion. The subsoil is of firmer texture, and continues to a depth of over twenty feet, the permanent water table occurring at about that distance from the surface.

The soil marked (B) is a sandy loam also, red and deep, with the same subsoil as (A) and occasional masses of lime (Kalkbank), which, while augmenting fertility, materially enhance the difficulty of uniform irrigation.

The third soil (C) occurs in the lower part of the farm in level stretches, and consists of a grey calcareous loam, with a white chalky subsoil and brak water permanently found at from 3 to 5 feet below the surface. In parts this soil is difficult to work, being plastic when wet and liable to crack and cake when dry. The first two soils are obviously deficient in organic matter, the last is fairly well supplied, as both appearance and analysis show. The transition from one to the next of these types is gradual, although each sort is itself clearly distinguished.

The conclusions arrived at at Robertson are probably reliable for all that red sandy Karoo type of soil which is frequently met with in Breede River Valley. Using due discretion, the facts are also to be regarded as applicable for irrigated lands throughout the Klein Karoo region and more or less for Karoo conditions generally, especially for such parts as enjoy winter rains and a dry summer with an average rainfall of some twelve inches.

The Experiment Station is situated on a piece of the municipal commonage of Robertson under the Van Zyl Canal, a few minutes' drive from the town, and consists primarily of 24 morgen of irrigable land and a piece of dry land on which the buildings necessary have been erected. The land is held on lease, with option to purchase.

Certain live-stock is necessary for the economic utilisation of the produce of the land, and hence, in addition to the necessary draught stock, there are on the farm at present cattle and pigs. These serve also an experimental purpose. Two pure-bred Ayrshire cows were originally purchased with a view to testing the suitability of this breed to the district and at the same time giving the farmers in the locality an opportunity of seeing for themselves what the breed is like and how it answers, and of providing in time, and if found desirable, pure-bred and acclimatised stud stock.

Similar examples of two breeds of pigs have been secured, the Large Black and the Berkshire, and both the pure breeds and the cross with the common pig found in the district will be tried and compared.

It is hoped as time goes on and opportunity arises to extend this side of the work for the instruction and benefit of the district.

In the erection of the buildings, the fencing and equipment, the experimental character of the undertaking has steadily been kept in view, and different constructions, materials, and machines have been used with the special object of testing and demonstrating the value and differences of all these.

The ultimate success of such an undertaking depends very much upon the manner in which it is received by those who it is intended to affect most intimately. It is through those living in the immediate vicinity that the beneficial influences can spread to ever widening circles almost as much as through the medium of cold print. For this reason personal visits to the experiment station by farmers and others interested are welcomed and every facility for inspection and interrogation afforded. Considerable and increasing advantage has been taken of this in the past, and it is hoped now that most of the constructive and preparatory work is over and that concrete results are being produced, the public will even more than hitherto visit the station and examine for themselves on the spot the problems being investigated.

A number of separate inquiries are at present in progress, and may for convenience be grouped under the following headings:—

1. *Irrigation methods*, measurement and the duty of water.
2. *Rotations*, to test intensive systems of working land.
3. *Cereals*, trials of varieties, of fertilisers, and of methods of cultivation.
4. *Tobacco*, Do. do. do. do. do.
5. *Potatoes*, Do. do. do. do. do.
6. *Lucerne*, Do. do. do. do. do.
7. *Production of new varieties of wheat.*
8. *The trial of crops new to Cape Colony.*

Each branch, however, includes a number of distinct series of experiments, and the number of plots in use is already in the thousands.

The possible lines of research are unlimited. The difficulty at present is to restrict the investigations within the narrow compass of our land and powers and to avoid the temptation to undertake too much. If durable and reliable work is to be accomplished, the hard rule, that of hastening slowly, must be learnt, and experimenters and public alike must be satisfied with one step at a time.

ROBERTSON EXPERIMENTS.—No. 1.

Methods of Cultivation of Cereals under Irrigation.

The following notes describe the outcome of a series of experiments carried out at Robertson with a view to ascertaining what treatment of the soil was most advisable, and what amount of tillage is most profitable.

The operations are of such a simple character and the conclusions on certain points so strikingly clear that this experiment specially commends itself as one which every farmer can readily imitate for himself. A simple trial may lead to a considerable gain, or, what is equally important, a material saving, and that too without incurring serious expense. The results of the experiments are not to be taken as true for all cases, but are of such a nature that any farmer can with advantage readily repeat them on his own farm. For instance, the profitableness or otherwise of subsoiling depends on local conditions, and will be appropriate on one farm and not on a neighbouring one, or even on one piece of land and not on another on one and the same farm. By such simple experiments, using such implements and labour as he may have, every farmer may readily ascertain for himself what process answers best in his case, and so make or save himself much money every year.

The following is the plan adopted at Robertson last season:—

The available area was ploughed and divided into four sections, two of which were at the same time subsoiled. The halves of two of the subsoiled sections were harrowed with ordinary harrows, the rest with disc harrows. On the land not subsoiled two sections were cultivated with the Martin cultivator and two with the disc harrow. Of each section one-half was sown with the broadcasting machine and one-half with the drill. Finally working across the furrows half was rolled and half was left rough. In this way 16 plots were arranged for each of the cereals, wheat, oats, barley, and rye, 64 plots in all. In all other respects as regards soil, irrigation, size, and situation, dates of tilling, sowing and harvest, the

plots were treated as uniformly as possible. Unfortunately, certain rye plots were damaged by standing water, and these results had to be discarded.

The land set aside for this purpose was much overgrown with quicks. These had to be cleared before the land could be used, and as the farm was occupied only after all hope of a friendly frost which would kill the upturned quicks was passed, the following process had to be resorted to:—

The land was skim ploughed to a depth of 4 inches, twice cultivated, then repeatedly harrowed, and the grass and its runners and roots collected into heaps and destroyed. Had the ground been cloddy a roller, in addition, would have been necessary. Laborious as it seems, this is the only practical way of dealing with the case. The cost of the operation was reckoned out at 14s. per acre. Subsoiling was done to a depth of 20 inches, costing, with subsequent harrowing, 12s. to 12s. 6d. per acre. Ordinary single furrow ploughing 8 inches deep cost 6s. per acre. The seed was pickled with Downs' Farmers' Friend and with lime, both processes being shown to be quite effective and a necessary precaution against smut. Including rain, the plot each received 18·304 inches of water in two wettings, 27th August and 29th October, in addition to the one preliminary to ploughing, which amounted to 4·75 inches.

Oats and barley were good crops, though late, sown on the 13th July, wheat and rye were comparatively poor. All the crops alike were much attacked by the lady-bird (*Epilachna similis*), and the ripe grain by real birds. The oats, of excellent quality, were cut on 20th November, the remaining crops at the beginning of December.

To consider first whether rolling is to be advocated or not under irrigation and on this soil. With wheat in every case the crop on unrolled land was better than that on the adjoining rolled plot, and on an average of 16 plots the difference in favour of the unrolled crop was close on 50 per cent. Since the plots differed in no other detail of treatment, the result can only be attributed to this cause.

With barley, on the other hand, in every instance except two the rolled land gave the better return, hence in this case rolling is to be recommended in future.

With rye the result is not decisive, while with oats there is also still some uncertainty, though the majority of plots pointed to the inexpediency of rolling.

Repetition of the experiments in this respect are required, but there are good grounds for the advice that barley be rolled and that wheat be left unrolled on soils similar to those at Robertson. Rolling is, however, only one of several factors.

The various methods of working the soil were also all applied to seed sown broadcast and with the seed-drill. The machines used were the Massey-Harris broadcaster and the Superior seed drill made by the Superior Drill Company, Springfield, Ohio, adapted for sowing artificial fertilisers and every kind of seed. It was found to do everything well, from mealies and wheat to grass and lucerne, and was drawn by the two cart horses, whereas the broadcaster required six mules to draw it.

In every instance with wheat 16 plots—whether rolled or not rolled, subsoiled or disced or cultivated, the results are entirely in favour of drilling the wheat, the crop as brought off the land being exactly doubled by this one detail in treatment, while the grain was increased 36 per cent. The fact here brought out is one of prime importance.

Practically the same holds good of oats, where in one instance only is the result from drilled seed below that of broadcasted seed, while the average shows an increased return in favour of drilling of 62 per cent. over the broadcasted crop.

Such figures are decisive. Wheat and oats will henceforth be drilled at the Experiment Station, except where it is desired to demonstrate and confirm these results.

Barley, on the other hand, has done better sown broadcast than in drills. The reason for this is not apparent, but the fact remains, though the margin is small, five pairs of plots against three, and on the average an advantage of only 4·3 per cent.

These results and those for rye also cannot be regarded as satisfactorily settled, hence repetition will be necessary with barley and rye, while further confirmation will be sought with wheat and oats. The ground used is not adapted for showing the value of subsoiling. The soil was deep, uniform, and without such incidents as pan or tough subsoil. It is porous and friable, besides being watered artificially. In such circumstances the need of subsoiling is not indicated, and the process appears to have exerted no marked influence.

With wheat a slight tendency in favour of the subsoiled plots was apparent, but with the other cereals no decision could be arrived at.

Disc and spike tooth harrowing showed no advantage the one over the other; both were well and thoroughly performed, hence both were effective.

These results, while not in every instance decisive, yet give good grounds for the following conclusions as regards the culture of cereals at the Experiment Station, Robertson :—

(1) That subsoiling is in no case necessary.
(2) That disc and spike tooth harrowing are undecisive. The latter is the cheaper process.
(3) That wheat should not be rolled, but
(4) That drilling is very much superior in its results to broadcasting, and pays well.
(5) That oats also ought to be sown with the drill, not broadcast
(6) The cultivator seems indicated for this crop, while the efficacy of rolling is uncertain.
(7) That in the case of barley rolling is productive of distinct benefit.
(8) Broadcasting barley did better than drilling, though only very slightly so,
(9) Harrowing seems preferable to cultivating.
(10) In the case of rye the verdicts are less decided, and are best held over.

Once more it must be pointed out that these statements are not to be regarded as generally applicable and axiomatic, but refer only to one particular case, and are chiefly important as indicating how simple, yet how well worth the trouble it is for every farmer to make similar trials for himself.

ROBERTSON EXPERIMENTS.—No. 2.

IRRIGATION.—THE DUTY OF WATER FOR WHEAT, BARLEY, OATS, AND RYE.

The question is raised: Do farmers use water to the best advantage, or is there not apt to be waste and extravagance in the application of this most precious and restricted commodity? Many answers will be given; opinions obviously disagree. Should more water be commonly used than

is necessary the great gain to be derived by making this fact clearly and widely known at once strikes home. Great possibilities hinge on the question, for with the majority of irrigation schemes in Cape Colony the land available is considerably in excess of the supply of water. When figures are asked for a difficulty at once presents itself. They are unobtainable. Before any decision can be reached or discussion commenced the question must be answered: How much water *is* commonly used, and how much is necessary to bring any particular crop to maturity? The former question may be answered by actual measurement, an undertaking by no means beyond the abilities of most farmers accustomed to irrigation work, though one very rarely, if ever, performed. The latter inquiry is one for determination only by the process of experiment, and forms the subject of the present report.

The operations here described can only be regarded as preliminary gropings towards fuller light, and as the first steps towards the elucidation of the problem. Simple as is the work done, it is fundamental to a whole series of investigations of greater intricacy and of much interest and importance. Incomplete they unavoidably are, and repetition and confirmation will no doubt be necessary in years to come, but now at least a commencement has been made.

The problem set is not a question of how to produce the maximum crop regardless of the amount of water that will yield a crop, but rather to ascertain what is the most profitable amount of water to use; the amount, that is, that gives the largest return in proportion to the quantity used.

The aim of these experiments has been, in the case of the commonest crops of the locality,

(1) To ascertain the duty of water on irrigated land in the Breede River Valley, that is to say, the volume of water used per acre in the production of crops;
(2) To compare the results of scanty, ample, and excessive irrigation;
(3) To determine what quantity of water is actually given in what is locally understood by one "wetting";
(4) To compare the water requirements of different crops grown.

Taking first the winter cereals, barley, oats, wheat, and rye, the scheme devised consists in the application of fixed quantities of water to a number of plots of one-tenth of an acre each. Allowance had to be made for probable rainfall, which on the average of the last ten years amounts to six inches during the growing time of these crops, but which last season actually amounted to but 3·69 inches.

In the case where only one wetting was given this shortage could not be made up for fear of a late rain, hence in place of a minimum of 10 inches, the driest plots got only 8·09 inches. Such irregularities are in the nature of things unavoidable. In all other cases the desired quantum of water is very closely realised.

The land set apart for this inquiry consists of the usual red sandy loam, and, like the rest of the area, has been subjected for many years past to a most exhausting treatment, sown yearly with wheat, barley, or oats, with no manure, and lavishly irrigated. In the trials no fertiliser whatever was applied, as experiments in this connection were also only in their initial stages, were indeed in progress close by, and their secrets not yet revealed. Under these circumstances heavy crops were not anticipated.

Next season in continuing these experiments it will be possible from knowledge now gained to materially increase the returns by appropriate manuring, treating all the plots alike, thereby not affecting the issue,

In the experiments under review the seed was all sown on the one day, May 31st, Rietti wheat, with the Massey-Harris broadcasting machine at the rate of 50 pounds per acre, the rest by hand, Colonial Algerian oats at the rate of 120 pounds, local Cape barley at 80 pounds, and rye at 75 pounds per acre. The costs of ploughing, preparation of seed bed, and completed sowing works out at 7s. 3d. per acre.

The experiment station was only recently established, and hence certain disturbing factors have to be noted which to some extent militate against the precision of the result, though not probably affecting materially the final issues. The ploughing was unavoidably late, and the full benefit of the rains was not obtained. The labourers had to be schooled into the careful methods required in dealing with separate plots. Ubiquitous mole holes rendered water measurement and application most difficult. The surface was irregular and rough; in the past no care had been taken to attain that smoothness which is essential for exact and economical water leading. Owing to these causes there was a certain loss of "afloop," which it was equally impossible to gauge or to prevent. In future this source of error will be obviated.

The method of measuring the water supplied is by means of the Chipolletti weir, a simple notched board of special form and size. The depth of water passing over its horizontal lip is noted and the time, from which by reference to appropriate tables the quantity of water is calculated. *Vice versa*, the depth of flow being measured, the time required for a certain quantity of water to pass over can be reckoned, and that amount be put on to the land with tolerable precision.

After the preliminary wetting of 5 inches or 18·150 cubic feet per acre, the remaining amount of water intended to be given was divided over one or more applications, in apportioning which allowance was made for the rain falling during the interval. An examination of the accompanying tables will make clear the course of the experiments.

When ripe the crops were cut plot by plot, weighed and threshed separately, and after winnowing the clean grain from each plot, weighed.

The quantities of water were selected so as to pass from an undoubted deficiency to a positive superabundance of water. This was attained in all cases, except perhaps that of rye, where the heaviest crop corresponds with the most water, but indications are not wanting that a further watering would have caused a diminished return in this case also.

Barley has shown itself to be the crop most markedly influenced by deficiency of water. To this crop 8·69 inches and 14 inches were practically equally insufficient, 16 inches was a little better, but 18 inches and 20 inches had a marked effect, the yield was brought up from 10·5 to 18 and 24·7 for one. Twenty inches of water seems near the optimum figure, for with 22 inches and 24 inches we get no better results than with 18 inches. But since 20 inches of water gives a better result than 24 inches, then there has been an actual waste of that amount and loss in addition. The same amount of water might with advantage have been used on one-fifth more land, a no inconsiderable item where the land is as dear as it is at Robertson and the crops so valuable. This is an excellent example of the danger of over-liberality with water, not only was the extra water wasted, but positive injury was done to the crop.

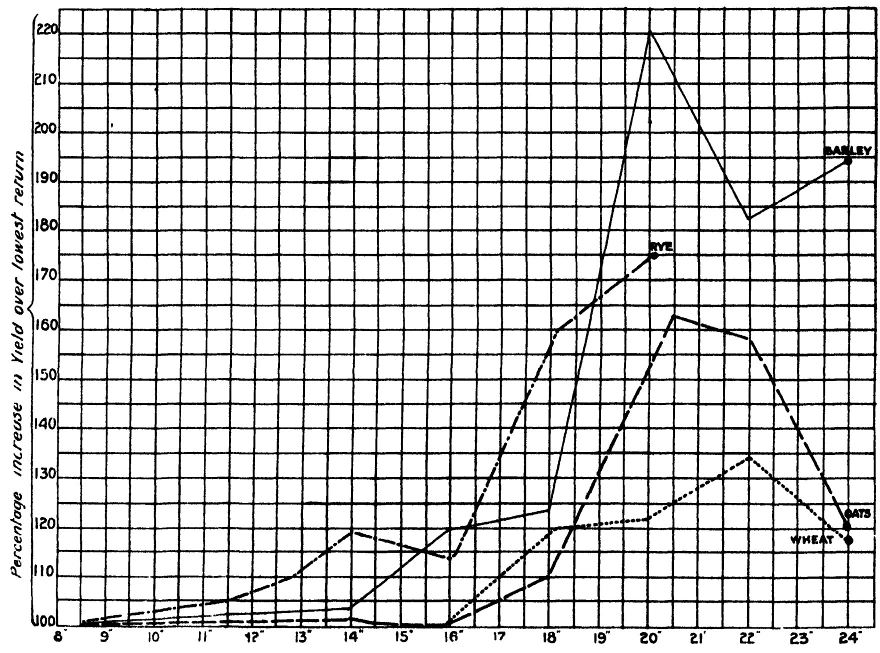
With oats the case is exactly parallel: 10 inches, 14 inches, and 16 inches of water are all alike so insufficient that no apparent difference results, 18 inches at once shows an approach to the requirements of the crop for water, while 20 inches and 22 inches are obviously in the region of the optimum amount, after which more water causes again a rapid diminution of the crop.

Wheat follows the same lines, though the differences are throughout less marked, and the maximum yield occurs only when 22 inches is reached,

indicating a less degree of responsiveness to irrigation and a larger water requirement, all pointing towards the relatively lesser suitability of wheat to the conditions of irrigation farming. This impression is confirmed by the poor return of about sixteen for one.

Rye, so far as it was taken, agrees with the above results, except for one small and probably accidental fluctuation. The return is brought up from 12·4 to over 20·6. Whether 20 inches is the maximum does not appear, but it would seem likely.

These figures are of striking interest, and the results are even more clearly seen when represented graphically; the ordinates representing ½ inches of water, either rainfall or from irrigation, and the abscissae the percentage increases over the lowest yields.



So far, then, as these experiments show we have to conclude that in the particular circumstances of the Robertson Experiment Station and the conditions of the season 1906, (1) the optimum water for barley and oats, and very probably for rye, is about 20 inches, while for wheat it is somewhat more, nearer 22 inches; (2) further, that barley shows the greatest responsiveness to irrigation, next rye, closely followed by oats, and wheat least in degree; but (3) that rye re-acts to additional water under drier conditions than do barley and oats, to which 14 and 16 inches of water are not materially better than 9 inches, all being deficient. (4) The limits of appropriate water supply for barley and oats are thus much more narrowly defined than in the cases of rye and wheat.

From observations in the field it would appear that what is locally considered a thorough wetting, such as is given preparatory to ploughing, amounts to from 4·5 to 5 inches of water over the whole surface, 15,000 to 18,000 cubic feet per acre. Allowing for 4 inches of rainfall during growth, there remains thus 11 to 11·5 inches to be led on to the crop. This may appropriately be given in three equal leadings, one when active growth

commences (August) and the crop is hand high, completely clothing the land, the second a month or so later, and the third just when the plants are shooting.

Allowance must be made both as regards time and quantity for such rain as may have chanced to fall, and in a good year with, say, 6 inches of rainfall, two leadings will suffice.

It has also been noted that a six-inch wetting is excessive and probably wasteful, while more can hardly be applied in one operation.

On the other hand, 2½ inches is as little as can be distributed over the ground, and even that it is difficult to spread uniformly on the slope and into the soil in question.

Simple as these observations are, at the outset of the work, it was impossible to obtain such data.

These figures are to be regarded as but a first approximation to the truth, subject to modification or confirmation by repetition. Further inquiries will be pursued step by step towards a fuller and more exact knowledge of the best and most profitable modes of irrigation of the crops and soil in question.

The conclusions here arrived at are applicable in the first instance to the Experiment Station at Robertson. The site was, however, chosen so that the results might be as generally useful as possible, first to those similarly situated in the vicinity, but also to a very large section of our farming community who farm Karoo soils under irrigation and with a rainfall of 12 inches or less.

ROBERTSON EXPERIMENT STATION. DUTY OF WATER, 1906.

Wheat.

Plot No.	Total Water.			Balance after deducting 5 inches for preliminary wetting, and 3·69 inches for Rainfall	Yield			Percentage Increase.
	Intended.	Applied.			Total	Grain	Rate of Return.	
	Inches.	Inches.	Cub Feet.		lbs.	lbs.		
1	16	16·19	58769·70	7·50 in 2 applications	1925	720	14·4:1	100
2	18	18·19	66029·70	9·50 in 2 applications	2320	795	15·9:1	120·5
3	20	20·19	73289·70	11·50 in 2 applications	2335	758	15·1:1	121·2
4	22	22·19	80549·70	13·50 in 2 applications	2580	830	16·6:1	134
5	24	24·06	87337·80	15·37 in 3 applications	2300	785	15·7:1	119·4

Oats.

Plot No.	Total Water.			Balance after deducting 5 inches for preliminary wetting, and 3·69 inches for Rainfall.	Yield of Oathay.	Percentage Increase.
	Intended.	Applied.				
	Inches.	Inches.	Cubic Feet.			
1	10	8·69	31544·70	Nil	2145 lbs.	101
2	14	14·14	51328·20	5·45 in 1 application ...	2123 lbs.	100
3	16	16·19	58769·70	7·50 in 2 applications ...	2125 lbs.	100
4	18	18·19	66029·70	9·50 in 2 applications ...	2410 lbs.	113·5
5	20	20·19	73289·70	11·50 in 2 applications ...	3425 lbs.	161·3
6	22	22·19	80549·70	13·50 in 2 applications ...	3393 lbs.	159·8
7	24	24·06	87337·80	15·37 in 3 applications ...	3555 lbs.	120

Barley.

Plot No.	TOTAL WATER. Intended.	Applied.		Balance after deducting 5 inches for preliminary wetting, and 3·69 inches for Rainfall.	YIELD.			Percentage Increase.
	Inches.	Inches.	Cub. Feet.		Total.	Grain.	Rate of Return.	
					lbs.	lbs.		
1	10	8·69	31544·70	Nil ...	1820	885	11:1	100
2	14	14·14	51328·20	5·45 in 1 application	1890	850	10·6·1	103·6
3	16	16·19	58769·70	7·50 in 2 applications	2185	1008	12·6:1	120
4	18	18·19	66029·70	9·50 in 2 applications	2270	1465	18·3:1	124·7
5	20	20·19	73289·40	11·50 in 2 applications	4030	1950	24·3:1	221·4
6	22	22·19	80549·70	13·50 in 2 applications	3355	1345	16·9:1	184·2
7	24	24·06	87337·80	15·37 in 3 applications	3525	1460	18·2:1	193·6

Rye.

					lbs.	lbs.		
1	10	8·69	31544·70	Nil	2310	930	12·4:1	100
2	14	14·14	51328·20	5·45 in 1 application	2730	1020	13·6:1	118
3	16	16·19	58769·70	7·50 in 2 applications	2610	960	12·8:1	112
4	18	18·19	66029·70	9·50 in 2 applications	3740	1395	18·6:1	161·8
5	20	20·19	73289·70	11·50 in 2 applications	4060	1550	20·6:1	175·7

ROBERTSON EXPERIMENTS.—No. 3.

IRRIGATION.– THE MEASUREMENT OF WATER.

The standards of measurement used in agriculture in the Cape Colony are peculiarly our own, the natural outcome of our needs and circumstances. Just as the unit of ploughing is the very variable "akker," and as the return of crops is reckoned at so much "for one," so also the amount of water applied to a crop under irrigation is not in ordinary farm practice measured, but is usually described as requiring so many boys for a given time to wet or as being equal to so many streams of water, by which is meant the same thing.

Sufficient for practical purposes as this plan is when water is abundant and to be had at all times, yet under other conditions now becoming common where the supply is restricted and only available at stated times, perhaps, it becomes of the utmost importance to know what such phrases really mean and how much water we are in the habit of applying to our land.

To determine this point is a comparatively simple operation, involving no deviation from ordinary farm practice, except the careful measurement of the ground and of the water whenever led. The crops in the experiments under discussion were given water at such times in such amounts as they appeared to require.

Water being only available in "turns," all the plots were irrigated simultaneously and equally, being given three wettings in addition to the preliminary one for ploughing, as follows:—

	Inches.
22nd May, 1906.—First or Preliminary Irrigation	4·55
6th August, 1906.—Second Irrigation	5·211
10th September, 1906.—Third Irrigation	3·926
4th October, 1906.—Fourth Irrigation	4·03
	17·717
Rainfall during growth	3·92
Total water	21·637

Each plot was half an acre in extent, and was well ploughed and prepared, and the seed was sown broadcast by hand on 30th May, 1906.

A number of other experiments carried on this year gave opportunities of checking the results obtained, and all being fairly comparable, have been collected together in the accompanying tabular statement. All these plots were without fertiliser of any kind, and although differing as regards treatment and situation, yet in other respects they were similar. The time of sowing varied considerably, and the returns have been tabulated in order of that date. This also corresponds to the amount of water given, the earliest sown also receiving most.

From Experiment No. 2 only the optimum application of 22·19 inches for wheat and 20·19 inches for oats, rye and barley have been recorded again here for the sake of completeness. From the results now before us it is evident that in the manurial experiment, No. 11, and Rotation Experiment, No. I., heavier crops would have been obtained had the second irrigation, *i.e.*, the first applied to the growing crop, been given somewhat earlier than was the case. The Implement Experiment again was commenced late, and the consequence is seen in the lightness of the crop and in the fact that this plot was attacked by lady-birds, although on the other hand the quality of the oat-hay reaped was the very best.

The rainfall during the period of growth was distributed as follows:—

June	1·07 inches
July	0·47 „
August	Nil.
September	0·33 „
October	1·78 „
November	0·09 „
December (1—10)	0·18 „

It will be seen that only at sowing time, and again during the period of most active growth in October was any material benefit derived from this source. As already indicated at the time these experiments were planned, there was no information with regard to the use of fertilisers obtainable, and hence to eliminate as far as possible all disturbing factors none were applied. In experiments of this nature it is essential to prevent any confusion of the issues. In considering the figures attached it is the relative and not the actual amounts that must be looked at. The crops harvested were light, but of good quality.

The aim of the experiment was to ascertain what was the proper duty of water on the Experiment Station, what quantity per acre is needed, that is, to bring a crop to perfection. Only after many repeti-

tions can a reliable average be struck, and this is therefore but the first approximation towards a factor which after several seasons may be more precisely stated. For the present the figure for ordinary winter cereals is 21·647 inches, or 78,278·6 cubic feet of water per acre. As has been elsewhere pointed out, the aim must be by good farming to reduce this quantity.

The figures now published serve to show that from 20 to 22 acre-inches gave the best results. With land in better order, and the means of distributing and regulating the flow under proper control, and with the experience gained this year, it may be possible in continuing these experiments, to economise the water and to be more precise in measuring and applying it. It also appears that while the sowing season is a long one extending from March to July, yet that early and late sowings are to be deprecated. The former practice entails an extravagance of water, not only to keep the crop alive in the season of slow growth, but also to prevent injury in case of frost. With a running river as a water supply there is no inducement to economise water as is the case with water conserved in a dam; on the other hand, excessive irrigation even where not prejudicial to the crop, is harmful in its washing effects and in waterlogging the soil and adjacent land, and by encouraging the development of alkali.

Late sowing it appears entails the use of a less total supply of water, but the crop is also a lighter one, and is more liable to attack by insect plagues. By different distribution of the available water, it may be possible to obviate the necessity for a fourth wetting, especially if favourable rains occur, and thereby to considerably economise the use of water. The same result may be achieved or assisted by employing cultural operations, or by the use of fertilisers accelerating the growth and ripening of the crop, but these are all subsidiary to ascertaining the best means of utilising the limited and precious element—water.

NOTE: YIELD OF CEREALS.

Incidentally and apart from the main issue, the data collected in the above table furnish interesting figures of the average yields of the common winter cereals of the Experiment Station without fertiliser. Naturally such figures fall considerably below the maxima as it is only one in every series of plots which receives the most favourable treatment. Thus the total water applied works out in the average including rainfall at 17·844 inches, but varies from 16·31 to 22·42 inches.

The returns of crops as shown below are small when the chemical composition of the soil, as shown by analysis is remembered, and is no doubt due to the exhausted state to which it has been reduced by many years of the same crop.

CROP.

CROP.	Average yield in pounds per acre on unmanured land.		Number of Plots from which average is struck.
	Total Crop.	Grain.	
Wheat	2258	610	28
Barley	2689	1218	31
Rye	2559	965	24
Oathay	2415	...	32

AGRICULTURAL EXPERIMENT STATION, ROBERTSON, CAPE COLONY. 1906–7.

TABLE showing the amount of Water used in growing Crops of Wheat, Barley, Rye and Oats, and its distribution throughout the growing period.

No.	EXPERIMENT. Character.	Date of Sowing.	1st or Preliminary Wetting.	Date.	2nd Wetting.	Date.	3rd Wetting.	Date.	4th Wetting.	Date.	Rainfall during growth.	Total Water.	Wheat. Total	Wheat. Grain	Barley. Total	Barley. Grain	Rye. Total	Rye. Grain	Oat-hay. Total.
			ins.		ins.		ins.		ins		ins.	ins.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
VII.	Application of Water.	31st May	5	18th May	6	13th Sept.	7·5	22nd Oct.	Nil	...	3·92	22·42	2580	830	...	...	...	...	...
		31st May	5	18th May	6	13th Sept.	5·5	23rd Oct.	Nil	...	3·92	20·42	...	..	4030	1950	4060	1550	3425
VIII.	Measurement of Water.	30th May	4·55	22nd May	5·211	6th August	3·926	10th Oct.	4·03	4th Nov.	3·92	21·637	2684	733	2714	1209	1912	606	2865
II.	Manurial ...	16th June	4·27	3rd June	5·425	27th August	4·372	2nd Sept.	Nil	...	3·92	17·98	1320	400	1365	750	2210	810	2310
I.	Rotation ...	26th June	4·1	15th June	3·372	4th Sept.	4·5	28th Oct.	Nil	...	3·92	16·89	1231	*	1959	865	1956	774	2485
IVa.	Cultivation ...	13th July	4·75	10th July	4·924	22nd Sept.	4·01	26th Oct.	Nil	...	2·85	16·534	1338	343	3474	1584	2505	822	2690
IVb.	Implements ...	15th July	4·43	12th July	5·0	27th August	4·5	29th Oct.	Nil	...	2·38	16·31	...	...	..	...	...	...	2235

* Irregular owing to damage by birds.

REVIEW.

THE FORESTS AND FOREST FLORA OF THE COLONY OF THE CAPE OF GOOD HOPE. By Thomas R. Sim, F.L.S., F.R.H.S., etc. 4 to. pp. vii., 361, with 164 plates and map. Published under the authority of the Government of the Cape of Good Hope.

The publication of this splendid volume will be welcomed by all who are interested in Cape Forestry, or, more generally, in Cape Botany. It is of good omen for the future of scientific investigation in South Africa that a work of this magnitude and utility has been conceived and executed by a South African Forest Officer, and has received the official recognition of the South African Governments. All scientific work is, directly or indirectly, in the interests of the community, and when, as in this case, an investigator has devoted the leisure of several of the best years of his life to the accumulation of a mass of useful and, in some respects, indispensable information, it is no more than fitting that his work should go forth bearing the official stamp of the public approval.

The facts here presented fall naturally into three classes, viz., historical, technical and botanical. Throughout the author has kept prominently before him the needs of the forester, for whom the volume is primarily designed "Each (forester) ought to be familiar not only with the appearance, but also with the properties, uses and distribution of the reserved kinds, whether he knows the unreserved kinds or not. But up till now such information has only been easily obtainable in regard to a few kinds; what literature exists upon the subject is in such a scattered condition as to be mostly inaccessible. . . . . It is hoped, however, that the presentation in one volume of illustrations and descriptions of all the reserved kinds, and of all the more important unreserved kinds, may in some measure meet this most urgent requirement of the forest staff, and form a foundation to which much additional material may from time to time be added as it comes to hand." It may be stated at once that the task thus outlined in the preface has been performed with so much care, judgment and efficiency that this book must henceforth be an important item in the Cape Forester's equipment.

The chapters entitled respectively "Reduction of forest areas in the Past" (v) and "Epitome of the history of Cape Forestry" (x), are mainly historical; they are full of interest, though they contain much that affords by no means pleasant reading. It appears that before the European occupation the forests did not suffer to any serious extent from human enemies, save indirectly as the result of grass-fires. The effects of the advent of timber-using and timber-wasting races have been deplorable and far-reaching. We read, for example, that "parts of the Mountain range of the Cape Peninsula were sufficiently well wooded to yield commercial 'yellow-wood' planks and other valuable timber"; that "Hout Bay possessed a consider-

able forest, and took its name from it"; that "the forests of Swellendam and neighbouring districts were not merely the isolated kloofs which now remain"; that "the Clanwilliam mountain range was once thoroughly forest-clad" (p. 42). A report on the forests of George and Tzitzikama, written in 1883, describes how "all those forests which have been easily accessible for any length of time are completely exhausted; not because a larger quantity of useful timber has been drawn from them than they were able to produce, but because the random and careless manner of working has destroyed and wasted 27 times as much wood as has been used and the growth of young trees handicapped beyond measure. . . . . . Ten years more of such management would have sufficed to strip the Colony of every forest it possesses" (pp. 43, 44). "In Fingoland almost all the forests, and in Tembuland and Western Pondoland large forests have entirely disappeared, and of a large forest in the Umtata district . . . . not the slightest trace is visible at this present day" (p. 46).

In this work of wholesale devastation forest-fires, usually commencing as grass-fires outside the forests, have, as usual, played an important part. Dr. J. C. Brown records that a Constantia forest, valued at £10,000, and another near Humansdorp, worth £25,000, were burned out, while in the great fire of 1869 in the Midland Conservancy "an area of 400 miles long, varying in breadth from 15 to 150 miles, was devastated" (p 44). To guard the existing forests against destruction by fire great expense is incurred in planting "fireproof" belts, and in other cases by burning protective "fire-belts." In 1900, in the Eastern and Transkeian Conservancies, no less than 487 miles of these fire-belts were burned (p. 44). It is clear that the forests in South Africa, as in many other parts of the world, have suffered serious injury, and are still constantly placed in jeopardy, by the burning of the vegetation in the neighbouring grass-lands. The literature dealing with grass-fires is now a very large one, and there seems to be a fairly general consensus of opinion that, in the long run, many types of grass-land have permanently deteriorated in consequence of this practice. The subject has not received the attention in this country that it deserves, and it is high time that the economic wisdom of the periodical destruction of the vegetation over large tracts of country, for the sake of a real or imaginary temporary improvement in its feeding qualities, should be submitted to careful tests. There is reason to believe that recurrent fires, aided by over-stocking, have led to the transformation of valuable grazing-grounds into useless scrub. If this is so there is no doubt that a similar deterioration of the veld is still proceeding over extensive areas in many parts of the country. In the interests of the grazing industry a careful study of the immediate and ultimate effects of grass-fires upon the composition of the flora is urgently needed, and if the conclusions of many observers in other parts of the world should be found to apply also to South African conditions, the lessening or total prohibition of this periodical destruction will become imperative.

A similar conclusion is based upon considerations of even greater importance to the general welfare of the country. The effects of the existence of forest-growth, and, to a less degree, of grass-covered areas, upon the conservation of water in the soil, and indeed of soil itself, are well known; that they are also factors affecting the climate in other ways, at present less capable of precise definition, must be admitted. The author is apparently justified in accepting as well-founded the widespread belief that South Africa is at present undergoing a steadily increasing process of desiccation. While not suggesting "that man's reduction of the forests and of the well-clad grass-lands have alone brought about these conditions," he forcibly urges that "to counteract such an enormous evil, even to some little extent, and to delay as far as possible the advent of what lies beyond man's power,

is a pressing duty alike upon the Government and upon the individual. . . . . . Not only do the forest areas require maintenance and extension, but even the grass-lands, so far as can be, require to be saved from burning and excessive grazing, and . . . . it is well worth consideration whether grazing on grass-lands attached to the Crown Forests should not be stopped altogether."

The domestic architecture of the native, as is evidenced by the picture of a Pondo hut in course of construction (facing p. 22), has also been the cause of a great waste of valuable forest products. The framework of each hut contains about a thousand young trees, and it is estimated that 6¾ millions are cut down annually for this purpose alone. Black wattle plantations are now established, with a view to lessening this drain upon the indigenous forests. The destruction of forests to provide space for native cultivation—which, with the wasteful methods in use, is only of agricultural value for a few seasons—has been, and is still, one of the great difficulties in the way of conservation. From these and other causes "it seems probable that the high forests now occupy about half the area they did when brought in contact with the European, and even a smaller proportion remains of the Thorn veld and Protea-bush veld." After reading this melancholy story of improvidence, one is relieved to find the consoling assurance that "thorough renovation of management and of methods have taken place; the old *régime* has given place to a strong and enthusiastic Forest Department, and every effort is now being made to conserve what remains, and to make amends to nature for past misdeeds by the artificial afforesting and reforesting of very considerable areas" (p. 51).

Coming to actual figures, it appears that the Colony contains about 1,889 square miles "either under forest or reserved in connection with, or for, forestal operations" (p. 19). This is 0·21 per cent. of the total area of Cape Colony (including British Bechuanaland). Similar figures for other countries show that India has 20·71 per cent. of its whole area under forest, Russia 40 per cent., Germany 26 per cent., and Norway 21 per cent.; even Great Britain has one-twenty-fifth of its area under forest. The comparison, so far as Cape Colony is concerned, is, of course, not a fair one, for there is here so large a proportion of the surface incapable of bearing productive forest. But the author apparently accepts the statement that "a country like the Cape ought to have at least 25 per cent. of its area under forest, and it is quite possible for this amount to be obtained without trenching on areas valuable for agriculture" (p. 20). A detailed account of the progress of "Artificial Afforesting" (chapter ix.) shows that the total area under Government plantations was about 20,000 acres in 1902, when it was "increasing rapidly, though not yet nearly so fast as the circumstances of the case demand" (p. 70). Since 1902 it has increased to 23,182 acres. The author calculates that to supply internal demands alone there is necessary "the foresting of a total annual area of 7,000 acres for sleepers and general purposes, in addition to such minor forest products as mine-props, fencing-poles, firewood, wattle-bark, wattles, etc., etc." . . . The extension of the plantations is not a matter of any technical difficulty; it is only a matter of funds." At present the Colony is expending £250,000 per annum for timber from outside sources. More serious still is the undoubted fact that the increase in the world's forests is far from keeping pace with the growing demand for timber. It is therefore of paramount importance that there should be no delay in advancing the work of afforestation to such an extent that an internal supply, at least sufficient for the needs of the Colony, shall be presently available. To this end it is clear that, in the best interests of the country, the work of the Forest Department should be among the last to suffer from the policy of retrenchment, which the circumstances of the time have rendered necessary.

The general account of the South African Floral Regions (chapter 1) follows mainly the lines adopted by Dr. Bolus in his writings on South African plant-geography, and includes much valuable detail as to the economic composition of the forests. Many interesting observations which could usefully be made the subjects of further investigation are recorded in the chapter entitled "Factors affecting the Distribution of Species" (vi.). The view generally held by botanists, that the influence of geological formation (*i.e.*, in general, of soil) on plant-distribution is less marked in South Africa than in many other parts of the world, is confirmed as regards the distribution of the trees, the Proteaceæ, Box, Saffron-wood (Elæodendron), Yellow-wood, Clanwilliam Cedar and some others being apparently exceptional in this respect. The statement that the outer covering of the fruit or seed of *Olea laurifolia*, Curtisia and Podocarpus is sufficiently waterproof to prevent germination while it remains intact is of interest in connection with the general question of seed-distribution, a promising subject for research in South Africa; and the same applies to the observation that the seeds of some Acacias and other Leguminosæ, as well as of certain Proteaceæ, germinate most freely after they have been scorched by fire. A paragraph in another chapter—whose occurrence there may be quoted in support of the suggestion that a better arrangement of the facts recorded might, in some cases, have been possible—draws attention to the great field offered by the South African flora for enquiry into the methods of pollination (here called "fertilisation"), which have been little studied (p. 48) The recognition of the practical importance, from the point of view of the forester, of the root-tubercles of *Podocarpus Thunbergii* and *P. elongata* (pp. 48 and 336), tends to confirm Nobbe's statement as to their function in nitrogen-assimilation, and points to the desirability of further experimental work on plants growing in their natural habitats. So far as we have seen the references to diseases of trees caused by fungi or other agents are few, and their scarcity emphasizes the need for investigation in what is practically an unworked field. In the interests of forestry, no less than of agriculture, the institution of research in mycology and plant-pathology is an urgent necessity.

The second and larger part of this volume, entitled "Forest Flora of Cape Colony," and occupying 244 pages, gives the botanical characters and an account of the geographical distribution and technology of some 500 species The task of identification is materially lightened by the author's own figures, well-drawn though frequently somewhat conventional, and, for the purpose in view, sufficiently detailed, disposed on 160 plates, and representing 312 species. The inclusion of some plants and the omission of others shew that the usual difficulty in defining the limits of the Forest Flora has been encountered, but on the whole it has found a satisfactory solution The addition of colloquial names, both European and native, is a feature which will increase the value of the work, both to the practical man and to the botanist, especially as these have not been generally recorded for South African plants in botanical writings. It would have been more convenient for the reader if the distribution of each species had been made the subject of a separate paragraph.

Two genera, viz., Umtiza (Leguminosæ) and Heywoodia (Euphorbiaceæ), and five species, viz., *Dovyalis lucida*, *Umtiza listeriana*, *Excæcaria caffra*, *Phyllanthus? amapondensis* and *Heywoodia lucens* are described as new. These are all figured, but it is to be regretted that they are not founded upon quoted herbarium specimens—Sim, 2,480, "appears to be" *Phyllanthus amapondensis*, a species described from imperfect material. The omission will certainly cause difficulties in their identification by others than the author.

We are unable to agree with the reduction of *Encephalartos Friderici Guilielmi*, Lehm., to *E. cycadifolius*, Lehm., although it has the sanction of an earlier authority. The former is the name of the species now fairly abundant, but, according to the author, gradually disappearing, on doleritic ridges in the Cathcart district. There is some doubt as to the identity of *E. cycadifolius*, but if it is correctly described by Lehmann, it is certainly distinct, and may perhaps be a smaller plant found in the Willowmore district.

There are many other points in this part of the volume that might appropriately be the subject of further notice. It must, however, suffice to say that there is here a wealth of information, botanical and economic, much of it now published for the first time or collected from various official and other publications not easy of access, which will be of immense service both to the technical and to the scientific enquirer.

The index, so important a feature in a work of this character, is full and, so far as we have been able to test it, very accurate. A few misprints have crept in, and some of these are of sufficient importance to have been usefully included in a list of *errata*. These, however, are very difficult to avoid when the author is 7,000 miles from the printing press. Otherwise the preparation of the volume has left little to be desired, and the author's appreciation of the "careful printing and lithographic work" which have produced it is fully justified.

Mr. Sim is to be heartily congratulated on the successful completion of a task involving an immense amount of careful and critical labour. The results constitute an invaluable work of reference for foresters, botanists and economists, indeed for all who are interested in the progress of scientific investigation and forestal enterprise at the Cape, and one which will worthily occupy an honourable position among the more prominent publications on the systematic and economic botany of South Africa.

H. H. W. PEARSON.

MILK RECORD.

[ELSENBURG COLLEGE HERD.]

Subjoined is the Milk Record to 31st August :—

Breed and Cow.	Days in Milk.	Yield in Lbs.		
		During August.	Total to date.	Daily Average.
FRIESLANDS.				
Cleopatra	296	176	8246	27·8
Romula	201	1026	6522	32·4
Victoria	190	879·5	5224·5	27·4
Violet	73	1061	2505	34·3
Bell (1st calf)	31	980·5	980·5	31·6
Rose (2nd calf) ...	5	194·5	194·5	38·9
JERSEYS.				
Gladys	86	1117	3080	35·8
Gertie	76	1009·5	2579·5	33·9
Fuschia (1st calf) ...	12	269	269	22·4
Grace (1st calf) ...	12	214	214	17·8
AYRSHIRES.				
Cherry	132	547	2936·5	22·2
Queen Dot	81	759	2375	29·3
Lobelia	29	1020·5	1020·5	35·1
SHORTHORN.				
Maggie	342	494	6595·5	19·2
CROSSES.				
Disa	150	615·5	3352	22·3
Jean	12	479	479	39·9

The average per head for the month is just over 15 bottles—a marked fall from July as the average milking period drops from 145 to 108 days.

BACON CURING ON THE FARM.

By Loudon M. Douglas.

Author of "Manual of the Pork Trade," "Douglas's Receipt Book for Bacon Curers, etc." Joint Editor of "Douglas's Encylopædia of Bacon Curing, Meat, Food and Provision Trades," Editor of "Douglas's Encyclopædia of Dairying," Author of "Refrigeration in the Dairy," etc., etc., Joint Editor of Dr. Swartz's "Abattoirs and Cattle Markets," etc.

In the development of a new country from the agricultural point of view, it is essential to keep in mind that the most profitable way to work the dairying department is by utilizing the bye-products. In the manufacture of butter the principal bye-product is separated milk, and in cheese-making it is whey. Both of these commodities lend themselves to pig-feeding, and indeed, provide about the very best food for the production of bacon. So far back as 1847 this fact was recognised by Youatt, who is perhaps the most trustworthy of authors on the pig In his treatise entitled "The Pig," he states in the chapter on feeding, that "for stye-fed pigs the washings of the dairy, as butter and skim milk, whey, etc., are excellent, and especially when thickened with barley or oat, or pea-meal, whey being more nourishing than skim milk; the animals thrive and make flesh so well on it that many farmers are of opinion that this mode of employing their sour milk is more profitable than making cheese. But when the swine have once become habituated to this kind of diet it must be continued, as they would fall off if put upon any other." Of course, many things have happened since 1847, and new authorities on the pig have sprung into existence since then. None, however, have materially altered the views of Youatt. Modern authors, such as Harris, Coburn, Spencer, Craig, Bondeson, Day, and others, practically confirm this opinion. It has been left to Professor Day to summarise the teachings of all the others, and to put in concise form in his book entitled "Swine," all that is worth knowing on the subject.

It seems quite certain then, that separated milk combined with barley is the ideal food for pigs, but a modification of this feed will no doubt suggest itself to many who are not in a position to use that cereal. Mealies may be used along with separated milk or green food, and the excess of oil which is present, and which goes to make oily fat in the pig is to some extent neutralised. But exclusive mealie feeding will not do. Some harder food such as cereals must form part of the feed, more especially when finishing off. A good plan is to graze the young pigs for five months, then stye-feed them on hard feed for two. In that way firm good bacon will be produced.

Amongst the foods which may be used are: Cooked potatoes, oatmeal and crushed oats, pollard bran, ground wheat, rye meal and separated

milk, but it must always be borne in mind that what is wanted is firm meat, and this can only be produced by feeding such a ration as will not give too much oily substance.

The great point in breeding pigs is the shape or conformation. A long square deep side is wanted, and it is just as cheap to feed pigs producing such sides as it is to feed short round ones that no one wants. Different breeds suit different districts and countries, and it would seem to be the opinion of many that black coloured pigs suit very hot countries best. The principal breeds cultivated in Europe are large Yorkshire and middle Yorkshires amongst the white pigs; the Tamworth, which is a red breed, and amongst the black breeds, the Berkshire, Suffolk and Sussex. Of all these I should think that either the Sussex or the Suffolk breeds would suit Cape Colony best, as they are good hardy pigs. The Berkshire is a fine pig for crossing, and splendid results have been obtained by crossing large whites with Tamworths and then with Berkshires, but local circumstances must always determine what rule is best to follow.

It is well to know the general principles which govern the matter, and modify these to local needs.

When the pigs suitable to the country have been produced, it then remains to find out what will be the best use for them. They can be handled in two ways, viz.: (1) They can be made into bacon on the farm; or (2) They can be handled in a co-operative or other bacon factory.

(1) Bacon Curing on the Farm.

The equipment necessary for bacon curing on the farm is small. The principal thing is to choose as cool a place for the curing process as possible, such as an outhouse or, better still, a cellar excavated out under any of the farm buildings; a small place will do. The floor should be laid with flagstones or cement, the atmosphere should be sweet, and the place should be dark, but should be well ventilated.

The bacon pig will weigh about 217 to 224 lbs. live weight, and this pig will turn the scale at about 168 lbs. dead weight; that is with the offal excepting the head, feet and flake lard, removed. It will be necessary, therefore, to provide a scalding vat for a pig of this size. A large half barrel or similar vessel will do. In addition to this a simple rope pulley block, a few wooden gambrels or spreaders, two or three 10 in. straight knives, a steel, 20 in. back saw, and a 10 in. Smithfield cleaver, will complete the tools required.

The pig is slung by means of the pulley block, which can be fastened to the branch of a tree or a cross beam, by one of the hind feet head downwards, and a sharp 10 in. straight knife is inserted in the throat in the direction of the heart, so as to sever the main blood vessels. The blood at once rushes out, and may be caught for use in making blood puddings, or allowed to go to waste. In a few minutes the carcase will be quite free from blood, and may then be lowered into the large tub already spoken of. This tub should be previously filled about half full with water at about 160 degrees Fahr., or just so hot that the hand cannot be held in it comfortably. The carcase is turned round about in this water until the hair comes away easily in the hand. The two hind legs are then slit, as to expose the sinews, and these are loosened with the finger. A gambrel or spreader is then pushed in beneath them, and the carcase is hoisted again into the vertical position head downwards. It is scraped all over quite clean, by means of a blunt knife, or, better still, a pig scraper, cold water being thrown over it occasionally meanwhile, so as to cool it down as much as possible. A slight incision with a knife is then made between the aitch bones, and this is continued right down to the

apex of the lower jaw. Next the knife is inserted so as to sever the aitch bones, and the bladder and organs of gestation are removed. The crown end is then cut round and removed, along with the fat gut which has been loosened right along the back. Then the remaining guts, stomach and fat are all pulled out. The liver and kidneys are taken out, and are at once thrown into cold water so as to cleanse them. The breast bone is severed by means of a saw, and the skirt is cut right round, as close to the flake lard as possible, and the heart and skirt are cut from the lungs and thrown into cold water to be cleansed. The lungs and windpipe are removed through the severed breast bone and cut off at the base of the tongue, which is left in the head, or may be cut out there and then so as to be used. All these various parts have their uses on the large scale, and they can also be utilised to much advantage on the farm. The guts or intestines should be cleaned thoroughly, then salted, and they can be used for sausage making. The liver, tongue, kidney, heart, etc., can be used fresh. The stomachs, if well washed and cleansed, make a very palatable dish.

The flake lard remains still in the carcase, and must be removed so that when that is done the whole inside can be washed with cold fresh water. The flake lard after cooling should be cut up and rendered.

It is necessary now to split the carcase in two, and this is done by making a straight continuous cut just under the skin right down the back from the root of the tail to the neck. The next cut is made deeper on the right side of the back bone, making that side clear and without leaving much meat on the bone. The left side of the back bone is cleared in the same way, so that the two sides are now separate.

In factories, where the " dead weight " is taken, the head, feet, flake lard, and back bone are all weighed in, but the remainder of the offal is not. If the pigs are weighed warm a deduction of 3 per cent. is made for " beamage."

On the farm, however, these matters are of no interest, as it is assumed that the farmer proposes to utilize most or all of the carcase in his own household.

When the head, feet, back bone and flake lard, have been removed, the sides are allowed to hang until quite cool. A cool shady spot is best for this purpose, and if possible, the carcase should be hung where there is a gentle current of air.

The next process is the curing of the meat. This cannot be carried out successfully unless the sides are cool and stiff. When this stage is reached they are taken down, laid on a table or a bench, and trimmed. The inside is scraped free from fat, and the neck is trimmed free from bloody pieces, the steaks are taken out and are utilized forthwith in the fresh state. The neck bones and aitch bones are cut loose, and the spare rib and breast bones are taken away along with these. The tops of the ribs are also sawn off, and the blade bone taken out. The large blood vein in the neck is removed, and the sides will then be trimmed complete.

It is now necessary to have ready some additional apparatus. A small pickle pump is necessary, together with a supply of pickle and a salino-meter to test same. The pickle may be prepared the day before, so that it will be nice and cool. It is made from the following receipe: —

14 lbs. salt.
1½ lbs. saltpetre.
1¼ lbs. dry antiseptic.
1½ lbs. cane sugar.

Make this up to five gallons with water, boil and skim till clear. The liquor should test 100 degrees or thereby on the salinometer, and if it does not, it should be made up to this strength with salt.

By the aid of the pump this pickle is now injected into all the fleshy parts of the meat, and the sides are then laid on a bed of salt on the floor of the curing place. The bed of salt should be about an inch thick, and a wooden stave should be used to press up the belly part of the side, which should be uppermost.

In the curing of hams there is very little variation from the method of curing bacon. The ham is cut from the side and nicely trimmed. It is then thrown into a tub of the pickle already mentioned, and allowed to soak for two days. The blood vein is then squeezed free from blood and the ham is laid shank downwards on the floor in a bank of salt. It is covered with the curing mixture similar to the bacon, and is kept 21 days in salt for mild cure, and about fourteen days more if required for keeping a long time.

The *Wet Cure* for bacon and hams is very often practised. The meat, both bacon and hams, is simply thrown into a pickle as given, and kept there until cured, the time being the same for either mild-cured or salt-cured meats as before.

Besides bacon and hams there are many other products which may be conveniently made on the farm, such as sausages and blood puddings. Then there is endless variety in dealing with the pigs feet, houghs, heads, tongues, etc. These should all be cured in pickle and cooked according to taste. It will be found, indeed, that with a little trouble much profit and satisfaction is possible by dealing with your own pig on the farm.

Now, sprinkle all over the side an equal mixture of dry antiseptic and saltpetre, just sufficient to whiten it, and on the top of this put a heavy layer of salt. In fourteen days thereafter the bacon will be "mild-cured," for it does not require to be touched again unless it has to be cured with the intention of keeping some months. Then, at the end of fourteen days it will be necessary to add another dressing as before, and keep for other fourteen days. The resulting bacon will be salty, but it will keep a good many months quite fresh.

When the bacon is cured, take it up from the curing bed and wash it in some cold fresh water, then hang it up so as to drain for a few days. If it is wanted as pale-dried bacon, it can be hung in the kitchen after dusting a little dry antiseptic all over it, especially into the pocket hole. It will be ready for consumption at any time, but will get a more pronounced flavour the longer it is kept. Should it be desired to smoke it, an old barrel may be requisitioned. It will require to be so deep that the side can hang freely in it. An old tin can, which has had a lot of holes punched in it is then filled with hardwood sawdust, and after lighting it, the top of the can is covered with an iron plate so that as the smoke and heat come out they do not ascend right on to the bacon, but curl round it, Three days may be taken to do the smoking, but that is a matter of taste. Of course, a better smoke house can be made by building a small place about four feet square and six feet high, with a few bars running over at the top to which the bacon can be hung, and a small ventilator on the roof; but that may be considered too expensive for the small quantity handled. Smoked bacon will keep longer than pale-dried because of the preservative qualities of the smoke.

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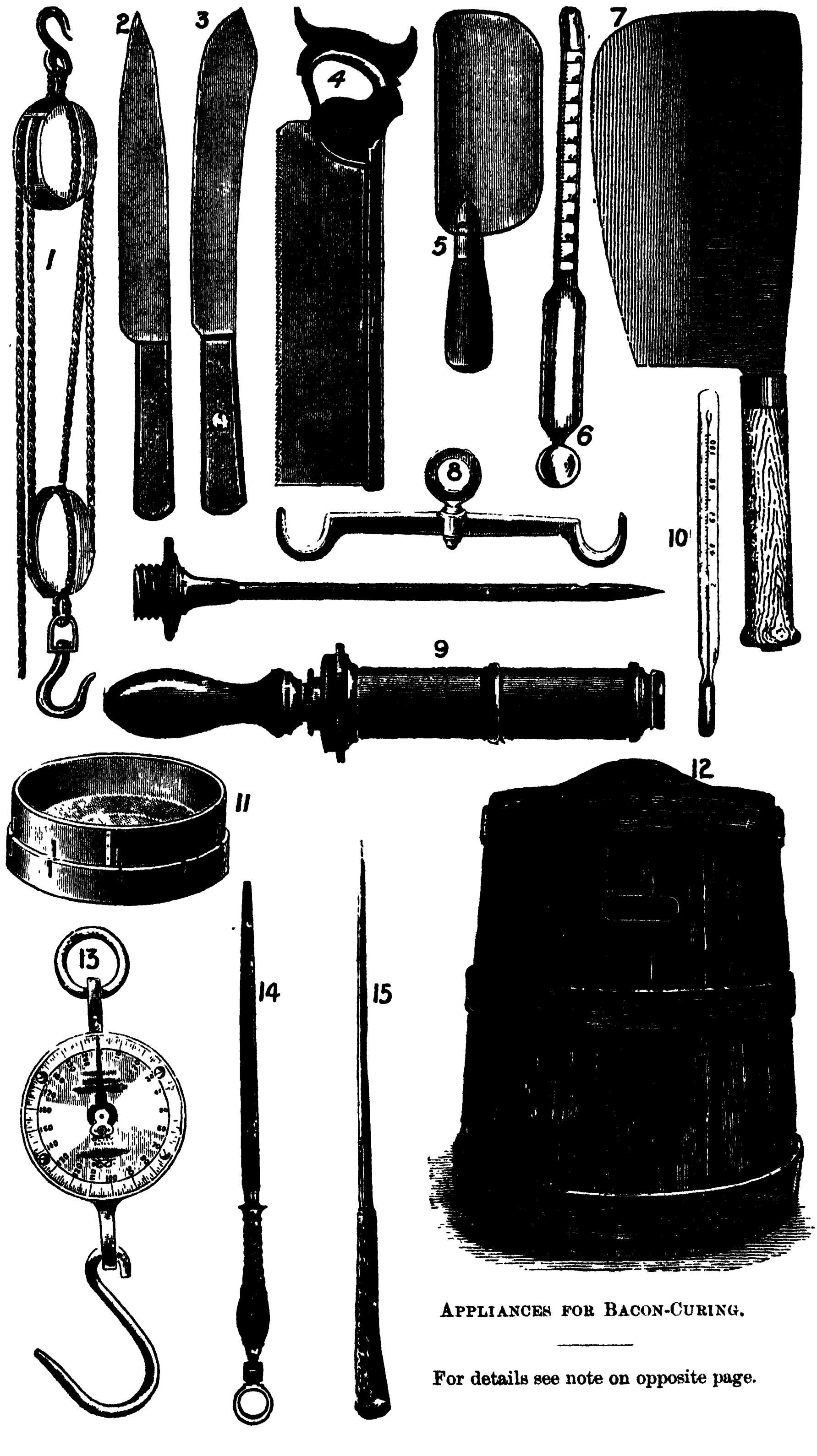
Co-operative bacon curing is a more extensive business which may be carried on by farmers associating themselves together for this particular purpose, and I propose to devote a special article to it, which I hope may be published in next issue.

I shall be glad to answer any questions which may reach me, or give more detailed information on the subject of bacon curing, either in the small or the large way.

All such enquiries should be addressed to me care of the Department of Agriculture, Cape Town, and may be sent in unstamped envelopes.

NOTES ON ILLUSTRATIONS.

(1.) A common rope pulley block is all that is wanted for hoisting. (2.) A sticking knife should be sharp and straight, and about ten inches long in the blade. (3.) A straight ten-inch shop knife is the one most commonly used for general purposes. (4.) A back saw with 20 inch blade is indispensable. (5.) A pig scraper of the flat type answers all purposes. (6.) The salinometer is necessary for testing the strength of the pickle, which should be about 100°. (7.) A Smithfield cleaver of about 10 inches blade is a necessary tool. (8.) Gambrels may be made of wood or galvanised iron. This one is galvanised iron, with a swivel ring, but a simpler one would do. (9.) There are many kinds of pickle pump, but on the farm a small pump or syringe will be sufficient. (10.) The meat testing thermometer enables the temperature of the meat to be taken. This is very useful sometimes, as meat of a high temperature (over 50° F.) will not cure with any degree of safety. (11.) The mixture of dry antiseptic and saltpetre can be put on the bacon or hams by the hand, but a more certain way of obtaining equal distribution is by means of the hair sieve. (12.) A pickling tub can be of any shape so long as it is roomy enough. Those made of oak or other hard wood last a long time. (13.) A common spring balance will answer all purposes. One to weigh up to 250 lbs. will be best. (14.) A steel is a very useful tool. It enables a keen edge to be put on the knives. (15.) The ham and bacon trier is very useful. By inserting it into the cured meat and smelling it after it is withdrawn it will be easy to tell if the meat is tainted or not. After withdrawing the trier, always close the opening made with the finger.



APPLIANCES FOR BACON-CURING.

For details see note on opposite page.

SOME ANALYSES OF CAPE WINES.

By J. Lewis, M.A.

(Read before the Cape Chemical Society, August 30th, 1907.)

The following analyses of Cape Wines, performed during the past few months, will, I hope, be of interest to the members of this Society. The samples are of definite origin, are unfortified, and have been subjected only to legitimate cellar treatment, including sulphuring, and in a few cases additions of tartaric acid and tannin.

The official German methods of analysis were used; Tannin was determined by the Neubauer-Lowenthal method; Nitrogen by the Kjeldahl process.

RED WINES. 1906 Vintage.

No.	Locality.	Grape.	Alcohol—Vol. per cent.	Alcohol—Gms. per 100 c.c.	Proof Spirit—per cent.	Extract—per cent.	Ash—per cent.	* Total Acid—per cent.	† Volatile Acid—per mil.	Total Tartaric Acid—per cent.	Cream of Tartar—per cent.	Sugar—per cent.	Glycerine—per cent.	Alcohol: Glycerine 100 to	Tannin—per cent.	Nitrogen—per cent.	Proteids—N x 6·25.	Sulphur dioxide—mgms. per litre.	Potassium Sulphate-gms. per litre.	Remarks.
1	Constantia	Cabernet S. ...	11·91	9·46	20·88	2·277	·264	·534	·660	·236	·296	·093	·755	8·0	·156	·0196	·1225	nil	·433	
2	,,	Hermitage ...	11·86	9·42	20·80	2·560	·293	·485	1·032	·180	·193	·112	·743	7·9	·257	·0413	·2581	,,	·831	Press wine.
3	,,	Hermitage and Cabernet ...	13·08	10·38	22·94	2·165	·248	·470	·690	·191	·240	·094	·836	8·0	·122	·0203	·1269	,,	·534	
4	Stellenbosch	Hermitage ...	13·34	10·59	23·37	2·586	·270	·554	1·152	·219	·221	trace	·787	7·4	·149	·0413	·2581	,,	·693	Little Cabernet. Soil low, sandy.
5	,,	,, ...	14·60	11·59	25·57	3·616	·317	·655	1·020	·127	·117	·127	·989	8·5	·201	...	...	70	·735	Hill, gravel and sand soil.
6	,,	,, ...	12·00	9·52	21·03	2·651	·273	·606	·746	·178	·223	trace	·834	8·7	·166	·0581	·363	50	·507	Vlei, sandy soil.
7	,,	,, ...	11·22	8·90	19·69	1·944	·287	·466	1·536	·178	·221	trace	·827	9·3	·170	·0294	·184	61	·600	Sandy soil.
8	,,	,, ...	9·62	7·63	16·86	2·818	·314	·619	1·198	·221	·277	...	·704	9·3	·125	·0469	·293	26	·735	

* As Tartaric Acid. † As Acetic Acid.

1905 Vintage.

9	Constantia	Hermitage and Cabernet ...	12·71	10·09	22·28	2·118	·232	·527	·834	·135	·169	·081	·835	8·3	·121	·016	·100	nil	...	
10	,,	Hermitage ...	12·34	10·59	23·37	2·472	·276	·474	·640	·180	·117	·036	·799	7·6	·083	...	...	48	·992	
11	Stellenbosch	,, ...	12·59	9·99	22·08	2·681	·347	·635	1·038	·088	·100	·026	·870	8·8	·147	·055	·341	281	·675	Hill slopes, gravel, slatey, sandy.
12	,,	,, ...	12·44	9·87	21·83	2·872	·358	·753	2·136	·090	·113	·037	·885	8·9	·159	·057	·359	176	·818	Vlei, sandy soil.
13	,,	,, ...	12·07	9·58	21·21	2·870	·341	·714	1·122	·118	·136	·083	·992	10·4	·163	·055	·341	120	·832	
14	,,	,, ...	12·13	9·62	21·27	2·262	·252	·616	1·248	·236	·273	trace	·785	8·1	·110	·028	·175	21	·847	
15	Paarl ...	,, ...	12·13	9·62	21·27	2·276	·256	·544	·996	·236	·211	·053	·784	8·1	·130	·027	·171	8	·753	High gravel soil.

1904 and 1903 Vintages.

16	Constantia	Hermitage and Cabernet ...	12·98	10·30	22·75	2·228	·232	·516	·744	·168	·188	·082	·919	8·9	·126	·0126	·079	nil	·598	1904.
17	,,	Hermitage ...	12·40	9·84	21·73	2·078	·244	591	966	·251	·169	·046	·903	9·2	·107	...	...	,,	·781	1903.
18	,,	,, ...	11·80	9·37	20·60	3·030	·225	·599	·926	·300	·216	·039	·702	7·5	·130	...	...	,,	·712	1904.
19	,,	,, ...	12·05	9·56	21·11	2·124	·241	·541	·852	·251	·268	trace	·728	7·7	·093	·0266	·166	,,	·762	1903. High gravel soil.
20	Stellenbosch	,, ...	12·05	9·56	21·11	2·333	·277	·538	1·020	·246	·147	trace	·757	7·9	·132	·0252	·157	,,	·750	1904. Low sandy soil.

WHITE WINES. 1906 Vintage.

21	Constantia	Mixed ...	10·91	8·66	19·11	2·073	·207	413	·594	·105	·132	..	·732	8·4	·089	·0119	·074	nil	·524	
22	,,	Stein ...	14·18	11·25	24·85	2·416	·222	·763	·511	·274	·075	·276	·841	7·5	·052	...	...	138	·921	
23	,,	Green Grape ...	12·58	9·98	22·06	2·238	·247	·705	1·521	·242	·052	·253	·715	7·2	·065	·028	·175	120	1·491	High clay soil.
24	Stellenbosch	Stein ...	13·22	10·49	23·18	2·903	·238	·734	·864	·238	·085	trace	·863	8·2	·052	·0353	·221	252	·549	Sandy soil.
25	,,	Stein, Green Grape,	13·81	10·95	24·19	2·320	·245	·564	1·260	·169	169	...	·768	7·0	·045	·0230	·144	95	·756	
26	,,	White French	13·43	10·65	23·54	2·011	·214	·496	1·074	·182	·228	...	843	7·9	·046	·0196	·122	37	·500	

WHITE WINES—*continued.* 1905 VINTAGE.

No.	LOCALITY.	GRAPE.	Alcohol—Vol. per cent.	Alcohol Gms. per 100 c.c.	Proof Spirit—per cent.	Extract per cent	Ash—per cent.	Total Acid—per cent.	†Volatile Acid—per mil.	Total Tartaric Acid—per cent.	Cream of Tartar per cent.	Sugar—per cent.	Glycerine—per cent.	Alcohol : Glycerine 100 to	Tannin—per cent.	Nitrogen—per cent.	Proteids—N x 6·25.	Sulphur dioxide—mgms. per litre.	Potassium Sulphate-gms. per litre.	Remarks.
27	Constantia	Stein ...	13·43	10·65	23 54	2·189	·191	·659	710	·251	·103	·119	·813	7·9	·042	...	...	11	·785	
28	Stellenbosch	,, ...	13 38	10·62	23 44	2 398	·266	·701	1·089	·169	·088	·083	·905	8·5	·066	·035	·219	250	684	Sandy & gravel soil.
29	,,	,, ...	13·31	10·56	23·32	2·399	·225	·689	·708	232	·075	·084	·724	6·9	·059	·035	·219	207	636	
30	,,	,, ...	13·49	10·70	23 65	2·311	·239	·714	1·015	·201	·136	098	·913	8 6	·066	·033	·204	198	·615	
31	,,	,, ...	13·85	10·99	24·26	2·466	·247	·714	1·275	·197	·127	·092	·920	8·4	·068	·020	·127	204	·546	
32	,,	Green Grape ...	12·31	9·77	21 57	2·387	·195	·697	·471	375	·080	·082	·756	7·7	·046	..	...	61	·845	
33	French Hoek	.. ...	12·58	9·98	22 06	2·354	·249	·599	·712	·272	·094	·140	·642	6·4	·051	029	·184	79	1·044	High gravel soil.

1904, 1903 AND 1902 VINTAGES.

No.	LOCALITY.	GRAPE.	Alcohol—Vol. per cent.	Alcohol Gms. per 100 c.c.	Proof Spirit—per cent.	Extract per cent	Ash—per cent.	Total Acid—per cent.	†Volatile Acid—per mil.	Total Tartaric Acid—per cent.	Cream of Tartar per cent.	Sugar—per cent.	Glycerine—per cent.	Alcohol : Glycerine 100 to	Tannin—per cent.	Nitrogen—per cent.	Proteids—N x 6·25.	Sulphur dioxide—mgms. per litre.	Potassium Sulphate-gms. per litre.	Remarks.
34	Constantia	Haanepot ...	15·49	12·29	27·15	1·883	·182	·583	1·440	·161	·174	...	·824	6·7	·033	·008	·052	nil	·422	1902.
35	,,	Stein ...	11·35	9·01	19·89	1·734	·176	·599	·768	292	·207	trace	·615	6·8	·055	·010	·062	nil	·447	1903. Low sandy soil
36	Paarl ...	Green Grape ...	12·31	9·77	21·57	2·295	·248	·618	1·140	·262	·019	·352	·664	6·8	·043	·029	·179	65	1·683	1904. Low sandy soil

The following are the summaries of the figures for Tannin and Ash :—

TANNIN.—Red Wine (omit 2)—Av. ·136 Max. ·201 Min. ·083 ASH AVERAGE.—Sulphured Red Wines ·302 Sulphured White Wines ·229
White Wine ,, Av. ·055 Max. ·089 Min. ·033 Unsulphured Red Wines. ·248 Unsulphured White Wines, ·195

The number of wines examined is too small to permit me to draw many general conclusions, but a few points of interest may be noted. The cream of tartar shows interesting variations. The heavily sulphured wines contain relatively small percentages of this constituent, which decreases with an increase of sulphate ; the sulphur dioxide, oxidising to sulphuric acid, displaces tartaric acid from its combinations with metallic oxides. The low percentage of reducing sugar proves the completeness of the fermentation ; only three wines out of thirty-six contain over ·2 per cent. of sugar. The percentages of glycerine go far to remove the reproach that Cape wines are low in this constituent.

We have Average of Samples, ·806 per cent. Maximum, ·992 per cent. Minimum, ·615 per cent.

For the ratio $\frac{\text{glycerine}}{\text{100 alcohol}}$ which varies in Europe from 7 to 14—we have Average 8 0. Maximum, 10·4. Minimum, 6·4.

with which may be compared the figures obtained from eighty-two German wines (Zeitschrift An. Chemie., 1900) :—Average, 8·9 ; Maximum, 14·3 ; Minimum, 5·1. The ratios in our wines show far smaller variations, while the average is only ·09 less.

ORANGE RIVER SILT AS A FERTILISING AGENT.

By C. F. JURITZ, M.A., F.I.C., Senior Govt. Analyst.

(*Read before the Cape Chemical Society, 30th August, 1907.*)

A somewhat special interest is attached to an analysis recently performed in the Government Analytical Laboratory of a sample of silt taken from the bed of the Orange River in the Prieska Division. There are at least two reasons for this statement: One is that amongst the many hundreds of soils which have been analysed in the laboratories from time to time there have been exceedingly few specimens of the silts carried along by rivers while in flood and deposited by them when they recede within normal limits after overflowing their banks Another reason is that, in addition to being chemically analysed, this specimen was also submitted to what is usually termed mechanical analysis, a process that has been but rarely applied here in connection with the various soils examined. The occasion may therefore warrant a few remarks in connection with the points raised

The practical agriculturist, who has had opportunities of becoming personally acquainted with the capabilities of such river deposits, is quite well aware of their fertility. This fertility is due not alone to the chemical constituents of the silt, important though these may be as plant food, but likewise to its physical condition. Chemical analysis alone can never suffice to measure a soil's fertility, still less its productiveness Let me repeat, by the way of emphasis, for it is a fact far too frequently lost sight of, the *fertility* of the soil depends upon other inherent properties besides the presence of plant food, for instance its texture and mechanical condition, and its *productiveness* upon variable environments and incidental circumstances, such as rainfall, atmospheric temperature, conditions of drainage and methods of cultivation; in other words, upon factors which are altogether extraneous to the soil itself. Hence a soil well supplied with plant food is not always fertile, and a fertile soil is not necessarily productive; the most fertile soil cannot be productive when climatic conditions are unfavourable, and the methods of cultivation adopted unsuitable; these distinctions require to be well kept in view.

Leaving out of sight, however, the wider subject of crop production, and turning again to the more restricted one of soil fertility, it would be well clearly to understand that even the chemical aspects thereof are closely connected with the soil's mechanical condition. The supply of water which circulates within the soil, and which is there tenaciously retained for plant use, is directly dependent upon the state of sub-division of the soil particles, other conditions being equal. The very availability

of the plant food constituents too, as we have previously had occasion to remark, is regulated by the fineness of division in which they exist in the soil. "It is not therefore a matter of surprise," says Dr. Wiley,* "that the fertility of a soil is found, *cæteris paribus*, to be commensurate, to a certain limit, with the percentages of fine silt and clay which it contains. It is true that two soils, quite different in fertility, may have approximately the same silt percentages, but in such a case it is demonstrable that even in the poorer soil the measure of fertility is largely the percentage of fine particles in connection with its actual content of plant food. Many soils may have large quantities of plant food, but these stores, owing to certain physical conditions, are not accessible to the rootlets of plants. . . The full value of silt analysis will only be appreciated when many typical soils, from widely separated areas, are carefully studied in respect of their chemical and physical constitution, and the character of the crops which they produce."

We see then how closely a study of the chemical composition of the soil must be interlocked with that of its mechanical condition. The one is never complete without the other, and it is much to be regretted not only that the exigencies of circumstances long ago compelled the jettison of a systematic investigation into the mechanical nature of the various agricultural soils of the Colony at the time when the chemical survey was commenced, but also that this important work of mechanical analysis, thrown overboard at the outset, has never yet been taken up again, and that the chemical analysis has now accompanied it into limbo.

The importance of clay as a component part of any soil is one of the chief reasons for the systematic mechanical analyses of soils. Not only does the clay bind together soil particles which would otherwise collapse into drift sands, but its own fineness of texture renders soils, which contain much clay, all the more retentive of moisture and the nutritious substances therein, when sands, although abounding in mineral plant food, may be unfitted for cultivation simply because moisture is lacking.

Moreover, the finest particles of the soil are those which contain the largest amounts of the elements of plant food in an available form, so that in every respect a soil containing a large proportion of clay is thereby the better fitted for plant sustenance, and, altogether apart from any question of direct chemical analysis, the mechanical analysis of a soil will frequently be a good index of its probable fertility.

Above and beyond all this it is to be remembered that a finely grained soil not only presents its plant food in a form better fitted for the plant to assimilate, but it generally has more of it to present. It is largely due to the fact that its soil has been built up of old alluvial deposits that the Oudtshoorn Division is so fertile; the rich silts and clays brought down from the Karroo by the Olifants and Gamka Rivers have, in great part, contributed to this.

It is well known that these rivers occasionally overflow their banks on their seaward course through the Mossel Bay and Riversdale Divisions, and thus contribute greatly to the fertility of the adjacent farm lands. I understand also that on the farms belonging to the Smartt Syndicate, in the Division of Britstown, traversed by a tributary of the Brak River, the practice, when the river comes down in flood, of constructing checks or weirs to control the passage of water and retain the silt, so as to ensure the deposition of the transported silt on the lands, has resulted in such a continual enrichment of the latter as to render any other mode of fertilisation needless.

* "Principlesand Practise of Agricultural Analysis," Vol. I., Soils, 2nd Ed.,1906, p. 310.

The particular sample of silt which has given rise to these observations was collected, in connection with the Buchuberg Irrigation project, from the bed of the Orange River at the Western boundary of the Government farm, Zeekoebaard, in the Stuurman Field Cornetcy, Prieska Division. The river was very low at the time, and the silt was only slightly moist. It subsequently dried as hard as a brick without being exposed to the sun or artificial heat. Wherever the river flows slowly enough, this mud is deposited, sometimes to the depth of many feet. Local farmers consider it to be extremely fertile, but, owing to its hard compact condition when dry, it is capable of employment for agricultural purposes only when mixed with sand or loose soil. If a water furrow be made of stones closely packed, and the interstices of the latter filled with this silt, the furrow is said to become perfectly watertight, so that the adhesive properties of the silt are considerable.

The chemical analysis of one portion of the sample, performed according to the methods usually practised in the Government laboratories, yielded the following percentage results:—

Water	5·99
Organic matter	14·81
Chlorine	·004
Nitrogen	·099
Lime	1·444
Potash	·473
Phosphoric Oxide	·221

The specific gravity of this silt is 2·03 on the basis of the dry specimen as above described, so that a cubic foot would weigh about 127 pounds. One acre of land, covered with the silt to a depth of half an inch, thus receiving a deposit of 1,815 cubic feet or 115 Cape tons of the silt, would therefore be enriched to the extent of:

3,314 pounds of lime.
1,086 pounds of potash.
507 pounds of phosphoric oxide.

In round figures, each such acre would receive about one ton and a half of lime, half a ton of potash, and a quarter of a ton of phosphoric oxide. The manurial pecuniary value of a ton of this silt, calculated upon the unit values hitherto adopted for fertilisers, would be:

	s.	d.
Nitrogen	0	10
Lime	1	2
Potash	2	1
Phosphoric oxide	1	0

that is to say, the value of the fertilising constituents, in an available form, added to each acre of land upon which the silt is deposited to half an inch in depth would, upon this basis, be over £30. These unit values, however, by no means accurately represent present commercial or market values; at the same time, the figures may be taken as indicating the fact that the pecuniary value of these silt deposits bears comparison and very favourable comparison with the cost of manuring in the ordinary way. It is scarcely to be wondered at if the Britstown farms need no other fertiliser: such a valuable accretion to the land surely deserves the expenditure of time and trouble in retaining it.

It is, of course, well known that this system of silting has been practised in the Nile Valley from ancient times, and sandy soils, comparatively worthless before, have become rich fields, and have remained productive

for thousands of years. Another case in point is that of the Rio Grande, the application of 24 inches of water from which adds nearly one quarter of an inch of soil to the field, in the form of river sediment, and supplies every acre with 1,821 pounds of potassium sulphate, 116 pounds of phosphoric oxide, and 107 pounds of nitrogen. With regard to this, King observes, *"Four years of irrigation at this rate would add an inch of soil to the field, and 24 years would cover it six inches deep with a sediment containing three times the amount of potash found in the average clay soil, and the same percentage of phosphoric acid and a high percentage of nitrogen."

As to the mechanical condition of the silt, not much need be said at this stage, especially as I hope to revert to that subject again when certain investigations in connection with the soils of the Government Experiment Station at Robertson are completed. It may, however, be stated that the silt was found to consist of the following, the results being calculated upon the basis of the absolutely dry substance:—

Particles larger than ·25 mm. diameter	Nil.	
Fine sand: ·25 to ·1 mm. diameter	·04	per cent.
Very fine sand: ·1 to ·05 mm. diameter	·25	„
Silt: ·05 to ·01 mm. diameter	3·25	„
Fine silt: ·01 to ·005 mm. diameter	25·28	„
Clay: Less than ·005 mm. diameter	71·18	„

It may suffice briefly, and without going into details, to explain here that the determinations of the coarse grades were made by digesting the silt with water on a steam bath for two hours, and then wet sifting it through sieves with meshes, respectively, a quarter, and a tenth of a millimeter diameter. The remaining grades were arrived at by sedimentation in a glass cylinder; the very fine sand was that which settled down through a distance of 200 millimeters, in 100 seconds; the silt, that which took between 200 and 1,000 seconds to settle down; the fine silt that which took from 1,000 seconds to 24 hours to deposit, and the clay that which remained suspended after 24 hours' standing.

Professor Snyder, of the Minnesota Agricultural Experiment Station, dealing with the preference of certain crops for particular types of soil, mentions the classes of soil which in a large number of cases, and under average conditions (*e.g.*, normal supply of plant food and an average rainfall) have proved to be satisfactory crop producers.† The better type of potato soils, he states, are those which contain about 60 per cent. of medium sand, 20 to 25 per cent. of silt, and about 5 per cent. of clay. For fruit growing purposes, he recommends soils containing from 10 to 15 per cent. of clay, and not more than 40 per cent. of sand. The strongest types of corn soils he calls those which contain from 40 to 45 per cent. of medium and fine sand, and about 15 per cent. of clay. Good grass and general grain soils should contain about 15 per cent. of clay and 60 per cent. of silt. For wheat production, he discriminates between three classes of soils: those of the first class contain from 30 to 50 per cent. of clay; those of the second type about 20 per cent. of sand, 50 per cent. of silt, and from 20 to 30 per cent. of clay; to the third class are assigned those soils which are composed mainly of silt, containing usually 75 per cent., and from 10 to 15 per cent. of clay.

Rich though it may be, the Orange River deposit contains too much clay, and is therefore too dense and heavy to enable it to be advantageously used in its original condition, but when deposited on the surface of a

* "Irrigation and Drainage," 2nd Ed., 1902, p. 259.
† "The Chemistry of Soils and Fertilisers," 1899, pp. 18 24.

sandier soil, with which it may be manipulated, it would add considerably to the agricultural value of the latter. If it could be directed on to a very sandy soil, containing, say, 90 per cent. of sand, a single flooding of the lands would—assuming a half inch annual deposit—increase the proportion of silt and clay in the soil to about 17, and diminish its sandiness proportionately; after a second flooding the soil so treated would consist of 76 parts of sand and 24 of silt and clay, and the third year would see the sandy soil converted into a loam composed of 70 per cent. of sand and 30 per cent. of clay.

King continues the passage already quoted as follows: "When such sediments are laid down upon coarse sandy soils, it will be readily appreciated that the gain to the field is far greater than that due to the mere plant food which the sediments contain; for such sediments, being composed of very fine grains, their influence in improving the texture of the soil is quite as great as that due to the fertilisers contained."

Reference has been made to Snyder's apportionment of differently graded soils to specific crops; but why such classes of soil should be so specially suited to some crops, and not to others, has not been fully stated. A partial solution may be found in the fact that it is a characteristic feature of each kind of plant that it requires for its development a certain degree of soil heat and specified amounts of water; both of these are dependent upon the mechanical condition of the soil. Now, according to Snyder, soils of the type that he prescribes as best suited for potatoes are so suited because such soils generally contain from 5 to 12 per cent. of water; similarly those which he recommends for fruit usually retain from 10 to 18 per cent. of water; those which are recommended for corn should, according to the same authority, contain about 15 per cent of water; grain soils ought to hold from 18 to 20 per cent. of moisture. These, it need hardly be said, are applicable to certain parts of the United States of America. In the Cape Colony we know neither whether soils mechanically composed as above would retain the proportions of moisture as stated, nor whether such proportions would be the optima for the classes of crops mentioned. What needs to be ascertained here is, first of all, what the mechanical condition of the soil is in localities where these crops do well, and next, how much moisture these soils are capable of retaining.

MERINO SHEEP AT AGRICULTURAL SHOWS.

THE CONDITIONS UNDER WHICH THEY ARE EXHIBITED.

The following paper was read by Mr. R. Pell Edmonds at the last meeting of the Stutterheim Farmers' Association: —

In offering to read a paper on this subject before our Association, I do so because I am convinced that the present methods of showing sheep are not in accord with the best interests of the wool-growing industry, and that agricultural societies are expending large sums annually to maintain and perpetuate what can only be called an artificial breed of sheep.

Of all the valuable domesticated animals, the merino sheep is the one which has to depend almost entirely on natural pastures. These vary with the seasons from luxuriant growth to the most scanty nourishment. At the same time, we desire it to grow a fleece of sufficient density to keep out rain and dirt.

Now, the one idea of agricultural shows—or certainly the one idea of the Government in subsidising them so largely—is that the country at large may benefit by the improvement of the breeds. But what do we find at the shows now? Sheep which have spent a great portion of the previous twelve months swathed in blankets, stabled, and fed on every form of nutritious food which will encourage growth of carcase and fleece.

It is by generous feeding that the English breeds have been brought to their present state of perfection. But the English farmer knows that his flocks will never suffer from want, and if he sees a ram that has been forced to a large size and excellent shape by skilful feeding, he buys him in the hope that by the same skilful feeding of his lambs they will equal the sire. But it is impossible for the South African farmer to bestow on his ordinary flocks a tithe of the care bestowed on the stud sheep he purchases in a show yard.

It is patent to all who have attended shows for some years that the sheep to be seen there are increasing yearly in size of carcase and weight of fleece, but the butchers do not tell us of any increase in size in the hamels. On the contrary, they frequently complain that they cannot purchase such fine sheep as they could in former years, and we never hear of a flock yielding fleeces in any way approaching the heavy fleeces of the show sheep.

But I do not, therefore, advocate lack of care of stud sheep. They are so valuable that they cannot be allowed to suffer like the ordinary flocks. What I deprecate is the excess of care which must in time tell on the constitution, and which tends to deceive and disappoint the breeder who purchases such a sheep for the improvement of his flock. Now take blanketing. A horse is blanketed to obtain a glossy skin; a beast to prevent a chill on being taken out of a warm shed. But the only object

in blanketing a sheep is to produce a false appearance of density, and I have no hesitation in saying that if blanketing was forbidden, many sheep now shown would stay at home.

Then in regard to housing. We want our flocks to grow a fleece of sufficient density to preserve the yolk and prevent the wool perishing, also to exclude dirt, so that we may be able to offer a clip of pure wool. But what chance have we of deciding whether a stud sire as now seen in the show yards can do this when he has been protected from every drop of rain. I cannot see any reason why we in this Colony should house sheep. I know from personal experience that sheep running day and night are in every way healthier, with the exception that during the summer rains they are liable to fever; but where sheep are seen night and morning, and taken in hand when the symptoms first appear, there is little danger of a serious attack. In proof of this, I may state that whereas a number of my flock sheep left to themselves lose their wool on recovery, I have never had a stud sheep lose its fleece when it has been properly nursed. In regard to feeding, owing to the prevalence of stock-thefts, jackals, etc., valuable sheep must be kept in small paddocks, where they can be constantly seen, and deficient pasture must at times be supplemented, but there is a great difference between doing this and giving a sheep all it will eat. I have kept some young stud rams in good condition this winter on four ounces each of soaked mealies.

The Australian breeders recognise the value of unhoused sheep, and at all their big shows the classes are equally divided between housed and unhoused, and some shows are entirely confined to unhoused sheep, but here no provision being made for unhoused sheep, it is useless for them to compete. I therefore think that the Agricultural Societies would be well advised to divide the entries into housed and unhoused classes, and entirely forbid blanketing, as they do artificial oiling. The sheep won't be so attractive to the eye, but the best sheep will suffer least, thereby making it easier for the prospective purchaser to select from them. The exhibitor might also be called on to declare what foods and what amount his sheep have received, as it is well known that various foods have different effects on the fleece. For instance, a sheep deficient in oil can be made to show a sufficiency if fed on linseed cake or peas, and a sheep with too much oil can be made to show less by judicious feeding on mangels.

I would also suggest that the money prizes should be made smaller. This would deter what may be called the professional showman from making a complete round of the shows, and incidentally make it not worth his while to pamper his sheep so much. It would also encourage many breeders who have good sheep kept under natural conditions to come forward, for as they have been put to little expense in the keep of their sheep, they can afford to show for the honour of winning. At the July meeting of the King William's Town Farmers' Association, a speaker stated that during the last show season, one exhibitor had won 150 prizes amounting in value to £1,000 (one thousand pounds) a handsome income from this source alone.

I notice that classes have been advocated lately for purely grass-fed sheep, but all who have tried showing grass-fed sheep know that they starve from the time they leave their veld to the time they return, and no one can be expected to submit valuable sheep to such treatment.

In conclusion, I would say that I in no way advocate lack of care of well-bred sheep. Every good sheep is a boon to the country, but all I want to emphasize is that a small improvement made in sheep kept under natural conditions is of more value than great improvement in what may be called "hot-house" sheep.

THE SCAB ACTS IN 1906.

REPORT OF THE CHIEF INSPECTOR OF SHEEP.

Mr. Alan G. Davison, Chief Inspector of Sheep, in his report for 1906, states that the improvement effected during the previous twelve months has been in most Divisions more than maintained. In certain parts we have suffered slight reverses, which, whilst disappointing, are after all only what might be expected, and are bound to occur until our present legislation is so improved as to afford protection for clean areas; bring more pressure to bear on the indolent farmer, and enforce the destruction or fencing of infected kraals and sleeping places.

Generally speaking, there has been a marked decrease in scab, and some Divisions which were fairly free from disease at the close of 1905 are now declared to be quite clean. The reports forwarded by the Inspectors show that whereas, on the 31st December, 1905, the percentage of scab in the Colony was 4·84 per cent., this at the close of this year had been reduced to 2·88 per cent., or a decrease of almost two per cent.

On the 31st December, eleven Divisions, containing 1,147,181 sheep and goats, were reported by the Inspectors to be quite free from scab. For the corresponding period in 1905 there were ten Divisions, including 984,189 sheep and goats, which were declared clean. Five of these last-mentioned Divisions—Cathcart, George, Knysna, Stockenstrom and Tarka—are not included among the clean areas, as slight outbreaks have occurred, owing in nearly every case to the introduction of infected sheep, or the use of old kraals and sleeping places

The Divisions of Barkly West, Herbert, Humansdorp, Kimberley, Paarl and Victoria East have, however, been added to the list of clean areas. The improvement already mentioned is further emphasized by the following comparative tabular statement, shewing the percentages of scab at the close of the years 1905 and 1906, viz.:—

Comparative Return showing prevalence of Scab (omitting Bechuanaland and the Native Territories), 1905 and 1906.

Year.	Free from Scab.		Under 1% of Scab.		1% and under 3%.		3% and under 5%.		5% and over.	
	No. of Divisions.	No. of Stock.	No. of Divisions.	No. of Stock.	No. of Divisions.	No. of Stock.	No. of Divisions.	No. of Stock.	No. of Divisions.	No. of Stock.
*1905	10	984,189	18	4,402,760	12	3,344,645	8	1,977,262	23	5,500,500
†1906	11	1,147,181	20	5,689,837	23	6,496,793	9	1,767,036	11	3,415,942

* 4 Divisions omitted. † 1 Division omitted.

From the above it will be seen that in 1906 there were only eleven Divisions in which more than 5 per cent. of the stock were infected as against 23 in 1905.

During the year, the reports shew a decrease of disease in 42 Divisions, a slight increase in 16, whilst in 16 the percentage is about the same—that is—the stock have remained clean or practically free from scab.

The Divisions in which the most infection exists at the present time, are:—Beaufort West, Calvinia, Carnarvon, Clanwilliam, Colesberg, Hopetown, Molteno, Swellendam, Uitenhage, and Victoria West, in which parts the percentage of scab varies from five and one half in Clanwilliam, to nineteen and one half in Carnarvon; the average percentage in the ten Divisions being slightly over nine and one half.

One more satisfactory proof of the advance that has been made is the fact that in many parts the flocks have not only been cleansed, but have remained clean for considerable periods. As an example I might quote the Division of Albert, in which the percentage of scab at the close of 1902 amounted to over 41 per cent. In this Division a marked improvement has been effected during the past few years. In one area of the Division, among 175 stock owners, 108 have kept their flocks free from scab, for periods ranging from one to five years. In another quarter of the same division 119 farmers have had clean sheep for from twelve months to four years. This progress is mainly due to the co-operation of the farmers, systematic dipping and the destruction of old infected kraals.

The figures I have quoted are instructive, for they show what can be effected when farmers and Inspectors combine in the endeavour to eradicate scab, and I have no hesitation in stating that if this assistance had been generally accorded from the time the Act of 1894 was first enforced, the flocks throughout the country would have been in a much healthier state at the present time.

Until stock owners realise the injury caused by scab, to a greater degree than many of them at present appear to do, we will never make the progress which should be attained. Dilatory methods of dipping, and neglect to take reasonable precautions to keep the flocks clean, are responsible for more outbreaks of scab than many people are aware of. Familiarity, it would seem, has to a certain extent bred contempt for the disease, and numerous stock owners still maintain that scab is bound to appear with every drought or indifferent season. I can only hope that in their own interests, farmers will commence to agitate for the cancellation of the liberal privileges embodied in our Acts for the removal of infected sheep, and for greater pressure to be brought to bear on the indolent and careless owner. Until restrictions are placed on the removal of scabby sheep, and due protection afforded to the careful farmer, we will never be able to make the progress which will correspond with the expenditure at present incurred.

The annual cost of administering the Scab Acts and Regulations amounts to over £80,000, and yet, notwithstanding the fact that this large outlay is devoted to the endeavour to eradicate scab, we have failed to cleanse the flocks of the Colony.

Our Scab Acts require amending in two ways. First: If a farmer will continue to breed scab, he should be made to pay for the privilege of doing so. Pressure could be brought to bear on this class of stock owner in the following manner: The first licence or order to cleanse should be granted free of cost; if scab still exists in the flock at the expiration of the period allowed, a renewal should be issued and a fine imposed of a certain sum for every sheep or goat in the flock, which amount should be doubled for every subsequent extension of the licence.

The argument is frequently used that in some parts stock can not be dipped on account of drought and poverty, and that thus the farmers in

these parts have a valid excuse for the existence of scab in their flocks. This I know is the opinion held by many, but it is one with which I am unable to agree. It is only natural that, when sheep are impoverished and grazing deficient, if scab appears it will spread more rapidly than if the conditions were favourable, but the farmer who attends to his stock and recognises that in his sheep he has a valuable asset which require all the care and attention he can bestow upon them, will anticipate the evil time and make such efforts that when the worst comes his flocks will be in a healthy state to weather the storm.

The second point is that the removal of infected sheep should be prohibited and a heavy penalty provided for every contravention. In the Act of 1894, there are four sections to which I wish to draw attention, and which deal with the removal of sheep. These are Clauses 26, 37, 38, and 41. Section 26 deals with the removal of clean sheep, and under its provisions an owner can issue a pass for the removal of his stock to any part of the Colony if his sheep are clean I regret to state that the liberal conditions of this clause are at times seriously abused and, not infrequently, infected sheep are removed under the protection of the permit mentioned.

Sections 37, 38 and 41 govern the removal of infected sheep, and are responsible for the spread of the disease in a very disastrous manner. If these very liberal provisions were withdrawn a further inducement would be offered for farmers to cleanse their sheep and maintain them in this state. At present the owner who is too negligent to free his flock from disease, knows that by once dipping or even handdressing the same, he can always obtain the necessary permit to remove his stock Why then, he argues, should he be put to more expense and trouble than is absolutely necessary. An apology is due for referring so frequently in my reports to these matters, but they are subjects of vital importance to the work of scab eradication, and until the necessary alterations are made we can expect but little real and lasting progress.

As indicated in my annual report for 1905, a certain reduction has been made in the number of the Inspectors with a corresponding decrease in the expenditure. In Albert, Aliwal North, Colesberg, Middelburg, Glen Grey, Peddie and Stutterheim, the staff has been reduced, and whereas 22 Inspectors were required to administer the Acts in these parts, there are now but 15.

We have, however, reached the limit at which reductions can be made without impairing the efficiency of the work, and I do not see my way clear to recommend any further reductions for some time to come. In certain Divisions such as Beaufort West, Calvinia, Carnarvon, Clanwilliam, Fraserburg, and Namaqualand, the need for additional Inspectors is urgently felt, and at least six extra men are required; if these are appointed there would be some prospect of scab being combated in a proper manner. At present the Inspectors are quite unable to do sufficient work owing to the great extent of their areas.

During the year several experiments have been carried out with a view of determining for what period a kraal may be considered a source of infection after scabby stock have been taken from it. Some of the tests have not been completed, and as it will be as well to embody an account of all the experiments in one report, these will have to stand over until next year. Some of the sheep dips most generally used in the Colony have also been tested on newly shorn sheep, as well as on animals carrying three and six months' fleeces; the object in view being to ascertain what damage is caused to the wool by the use of these ingredients. These dippings have been completed, but as the sheep have not yet been clipped, and the wool sent away for manufacturer's report, the result of the experiments will be included in my next report.

The contraventions of the Scab Acts reported during the twelve months total 850, the convictions 723, and the penalties amount to £1,979 11s. 6d., or an average fine of £2 14s. 9d. The numbers for the preceding year being 835 prosecutions, 724 convictions, and an average penalty of £2 13s. 4d.

The figures forwarded by the Inspectors at the close of the year when compared with those for 1905, show an increase of sheep and goats of almost two millions, the correct figures being 16,655,540 sheep and goats on the 31st December, 1905, and 18,516,789 at the close of the year. As the latter total does not include the Division of Mossel Bay, in which part there are about 130,000 sheep and goats, the increase I have quoted will be fairly correct.

The total number of lambs and kids reared amounted to 5,361,884, more than half a million in excess of the total for the preceding year. In 30 divisions the lambing is reported as good, in 32 fair, whilst in 12 it is said to have been bad. The total number of sheep lost from disease and other causes is about 60,000 less than last year.

In Bechuanaland but little progress has been made, as the four Inspectors appointed during the year are quite unable to cope with the work, which requires at least twelve men to perform it in anything like an efficient manner. The reports received at the close of the year show over 600,000 sheep and goats, but a large portion of some areas has yet to be examined. I trust that the additional men I have asked for on the Estimates will be authorised, when I have every hope that a decided advance will be made in the eradication of scab in this part of the country.

In the Native Territories, considerable progress has been made, especially in Griqualand East and Pondoland. In Tembuland and the Transkei there is, I regret to state, great room for improvement. At the close of the year the following districts were declared to be free from scab: Idutywa, Elliotdale, Mount Currie, Matatiele, Mount Ayliff, St. John's, Lusikisiki, and Flagstaff, containing in all 806,883 sheep and goats. In Tembuland and the Transkei the percentage of infected sheep at the close of 1905 amounted to 3·83 per cent., on the 31st December last this had been reduced to 2·90 per cent.

In Griqualand East the corresponding figures were 0·67 per cent. in 1905, and 0·25 per cent. on the 31st December. Pondoland shows the most marked improvement, for whereas on the 31st December, 1905, the percentage of scab was slightly over 35 per cent., at the close of the year the Inspectors reported but 1·55 per cent. as infected.

In Tembuland and the Transkei, in the districts of Nqamakwe, Tsomo, Umtata, Willowvale, Engcobo, and Elliot, the state of the stock is anything but satisfactory and during the last winter a large number of flocks in these parts were badly infected with scab. It is hoped that a considerable improvement will be effected during the course of the coming year, as, until these districts are cleansed, it will be impossible to safeguard Griqualand East from re-infection.

The contraventions of the Regulations for the twelve months totalled 882, the convictions 790, and the fines imposed amounted to £848 12s. 6d., or an average penalty of £1 1s. 5d. The figures for the preceding year were: 1,003 prosecutions, 793 convictions, and an average fine of £1 1s. 2d.

The increase of stock has been exceptionally bad. In two districts it is reported as good, in 11 as fair, and in 15 as bad. The number of lambs and kids reared amounted to 615,871, which, when compared with the preceding year, shows a decrease of 400,000. The losses from disease and other causes totalled 392,830, or 110,000 in excess of last year.

EVAPORATION LOSSES IN IRRIGATION.

A very interesting pamphlet, dealing with evaporation losses in irrigation and methods of reducing them, by Samuel Fortier, Irrigation Engineer-in-Charge of the the Pacific District, Irrigation and Drainage Investigations, has recently been issued by the United States Department of Agriculture.

The experiments have been carried out with considerable elaboration and care at several stations, and show that the conditions having the greatest influence on evaporation from soils are the quantity of water in the top soil, the temperature of the soil and water, and the wind movement. All the above causes can be controlled, to a large extent, by the irrigator by his methods of applying water and by subsequent cultivation of the soil. The application of water in such a way as not to wet the top soil, decreases the quantity of water in the top layer, and at the same time places the moisture in the soil beyond the influence of wind, and to a large extent, beyond the influence of the high temerpatures of hot days.

The results of the experiments point to the possibility of economising water (*a*) by applying it at night, when the surface is cool; (*b*) by applying it at sufficient depths to keep it from coming into contact with the hot surface layer of the soil; and (*c*) by frequent cultivation to maintain a mulch of loose soil, which will prevent the excessive heat from reaching the moist soil, and will destroy capillary action, which is the main source of loss by evaporation.

The following paragraphs give a summary of the results of Mr. Fortier's experiments: —

Cultivation after irrigation.—From soil which received sufficient water to cover it to a depth of 12 inches, 1·65 inches were evaporated in the first five days after irrigation. At the end of that time half of it was cultivated. During the next six days the loss from the uncultivated soil was 1·38 inches, and from the cultivated soil 0·63 inch, the saving for the six days being 0·75 inch, or 6·25 per cent. of the water applied. In the second experiment the depth applied was reduced to 8 inches, and the soil in one-half the tanks was cultivated at the end of three days. The loss for the first three days was 0·84 inch. During the next three days the loss from the uncultivated soil was 0·29 inch, and from uncultivated 0·1 inch, the difference in favour of cultivation being 0·19 inch, or 2·38 per cent. of the amount applied.

Soil mulches.—From soil receiving water enough to cover it to a depth of 3·14 inches the losses in fourteen days were: With no mulch, 0·72 inch; with a 4-inch mulch, 0·21 inch; with an 8-inch mulch, 0·1 inch; and with a 10-inch mulch, 0·03 inch. Taking the loss with no mulch as a basis, the saving with the 4-inch mulch was 0·51 inch, or 16·24 per cent. of the amount applied; with the 8-inch mulch it was 0·62 inch, or 19·75 per cent. of the amount applied; and with the 10-inch mulch it was 0·69 inch, or

21·97 per cent. of the amount applied. These mulches were made by placing dry soil on top of the tanks after the water was applied, and the results are better than can be secured in field practice, as the top soil is always more or less wet when fields are watered, but they show that large savings can be made by maintaining soil mulches by cultivation.

Applying water in furrows.—From tanks receiving 5·19 inches of water the loss in ten days was 1·11 inches when water was applied to the surface; when it was applied in 3-inch furrows the loss was 0·99 inch; with 6-inch furrows, 0·94 inch; with 9-inch furrows, 0·82 inch; and with 12-inch furrows, 0·63 inch. Taking the loss from the surface application as a basis, as before, the savings were as follows: Three-inch furrows, 0·12 inch, or 2·31 per cent. of the amount applied; 6-inch furrows, 0·17 inch, or 3·28 per cent. of the amount applied; 9-inch furrows, 0·29 inch, or 5·59 per cent. of the amount applied; 12-inch furrows, 0·48 inch, or 9·23 per cent. of the amount applied. Other tanks in the same experiments received 4·9 inches of water. The loss when water was applied to the surface was 1·34 inches, and the saving when water was applied in the 3-inch furrows, 0·15 inch, or 3·06 per cent. of the water applied; in 6-inch furrows, 0·43 inch, or 8·77 per cent. In all these cases the soil was cultivated to a depth of 4 inches on the third day after the water was put on. In another experiment, lasting thirty-five days, the soil received 2 inches of water in 3-inch and in 12-inch furrows. The loss with the 3-inch furrows was 1·82 inches, and with the 12-inch furrows, 0·49 inch, the saving with the deeper furrows being 1·32 inches, or 66 per cent. of the amount applied. The last experiment is outside the limits of field practice, as such light irrigation at such long intervals is not practicable.

Sub-irrigation.—When 5·2 inches was applied in tubes at varying distances below the surface the losses in a ten-day period were as follows: Three inches below surface, 1·34 inches; 6 inches below the surface, 0·96 inch; 9 inches below the surface, 0·55 inch; and 12 inches below the surface, 0·32 inch. On the basis of the loss with water applied at 3 inches the savings were 6 inches, 0·38 inch, or 7·14 per cent.; 9 inches, 0·79 inch, or 14·85 per cent.; 12 inches, 1·02 inches, or 19·17 per cent. In a second experiment water was applied to check tanks on the surface, and to other tanks through tubes 2 feet below the surface. With three different classes of soils the losses in twenty-six days were as follows: With sandy loam, receiving 7·02 inches of water, the loss from the surface-irrigated tanks was 4·22 inches, and from the sub-irrigated tanks 0·74 inch, the saving being 3·48 inches, or 49·57 per cent. of the amount applied. With a sandy soil the loss from surface irrigation was 3·64 inches, and from sub-irrigation 0·62 inch, the saving being 3·02 inches, or 43·02 per cent. of the amount applied. With a dark loam the loss from surface irrigation was 5·63 inches, and from sub-irrigation 1·96 inches, the saving being 3·67 inches, or 52·29 per cent. of the water applied. While sub-irrigation has never proven satisfactory, this experiment is interesting, as showing the large saving which might be made if sub-irrigation could be made practicable.

All the records show that the larger part of the loss occurs in the first few days after irrigation. With the soil mulches put on after the tanks were watered and with sub-irrigation the moist soil is protected during the first days, when evaporation is heavy. This accounts for the high percentages of saving under those two methods.

The experiments which have a direct bearing on present practice in irrigation are those testing the effects of cultivation after irrigation, and of applying water in furrows of different depths. As shown above, the saving in a six-day period by cultivation was 6·25 per cent. of water applied; and in another experiment, where less water was applied, the saving in a three-day period was 2·38 per cent. of the water applied. In both in-

stances the heaviest losses occurred between the time of applying the water and the time when the soil was dry enough to cultivate. The maximum saving shown by the furrow experiments was 9·23 per cent. of the amount applied, the experiment covering ten days.

Another point forcibly brought out by the experiments is the large loss when water is applied in frequent light irrigations. This practice keeps the water always exposed to the conditions causing the largest evaporation. Unless the nature of the soil or of the crops demands such irrigation, much water can be saved by irrigating less often.

The results of the above experiments are mainly applicable to the irrigation of orchards, vineyards, and to crops grown in ridges, such as tobacco, potatoes, etc., and also to preliminary wettings before sowing. When establishing lucerne it is particularly necessary to conserve the moisture of the first or preliminary watering before seeding. The seed should be put in as soon as possible after flooding, and further watering should be withheld until the lucerne has made a growth of considerable height. The frequent waterings of very young lucerne retards its growth, and hence every means for the conservation of the moisture of the first flooding should be adopted.

Once lucerne or other dense crops are established, surface evaporation is very much reduced by the shading and protection of the soil surface by the foliage of the crop.

VACATION COURSES IN AGRICULTURE.

AT RHODES UNIVERSITY COLLEGE.

During the past winter, from June 24th to July 13th, a series of Vacation Courses in agricultural subjects was given at the Rhodes University College, Grahamstown. The object was to attempt to supply within three weeks and the means available some of the demand now everywhere manifest among the rising generation of farmers for a knowledge of the principles and science of agriculture. Eighteen separate courses were organised, given by the Professors of the Rhodes University College, assisted by various officers of the Agricultural Department and others engaged in practical farming. The courses consisted mainly of lectures, illustrated and followed by practical demonstrations, including examination of specimens, dissections, and microscopic preparations, with opportunity for questions and discussions. The number of lectures in the different courses varied from one to eight. Visits were arranged to neighbouring stock and fruit farms and local industries. Students were also invited to a series of popular evening lectures and entertainments arranged by the College and City.

A Fee of £2 2s. was charged for the complete courses, and £1 1s. for any single course. Thirty-five students registered, a number which must be considered as highly satisfactory considering this to be the first attempt of its kind within the Colony. The Students were mainly young farmers of a highly intelligent class, drawn from practically all parts of the Colony, though mainly from the Eastern Province.

Below is given a short outline of each course, and by arrangement with the Agricultural Department certain of the lectures will be published in the *Agricultural Journal* appearing from month to month as space permits.

COURSES.

I.—HORSE-SICKNESS.—By Dr. A. THEILER, Bacteriologist, Transvaal Department of Agriculture. Three Lectures, with Demonstrations, on the Diagnosis, Conditions of Occurrence and Treatment of Horse-Sickness and Biliary Fever. (Will be published in full.)

II.—VETERINARY SCIENCE AND DISEASES OF STOCK.—By W. ROBERTSON, M.R.C.V.S., F.R.S.E., Director of the Veterinary Laboratory, Grahamstown. Eight Lectures, illustrated by Clinical Work and Dissections of Healthy and Diseased Animals at the Veterinary Laboratory. SYLLABUS:—1. The Anatomy and Physiology of Domestic Animals.—The Nervous System and Brain; the Digestive System; the Reproductive System; the Vascular System and Heart; the Blood and Principles of Absorption. 2. Nursing, Care and Diet of Sick Animals.—Stabling and Isolation; Disinfection; Means of Restraint; Food and Drink. 3. Uses of Medicines and Methods of Administration.—Details of simple General Surgery and Minor Operations. 4. General Rules for Recognising Diseases.—Pulse, Breathing, Position, Temperature, etc. 5. Preventive Inoculation for Animals of the Farm. 6. The More Common Diseases of the Various Sets of Organs.

III.—CHEMISTRY IN ITS APPLICATIONS TO AGRICULTURE.—By Prof. G. E. CORY, M.A., F.C.S., Professor of Chemistry and Metallurgy, Rhodes University College. Five Lectures, illustrated by Experiments. SYLLABUS:—Scope of Agricultural Chemistry; Chemical and Physical Changes in Soils; Solubility of Solids and Gases in Water; Hardness of Water; Nitrates and Fixation of Atmospheric Nitrogen; General Chemical Composition of Soils; Composition and Action of Manures; Special Applications of Chemical Practice to South African Farming.

IV.—AGRICULTURAL GEOLOGY.—By Prof. E. H. L. SCHWARZ, A.R.C.S., F.G.S., Professor of Geology, Rhodes University College. Five Lectures, illustrated by specimens. SYLLABUS:—1. Relation of soil to rock; the main rock groups illustrated by South African examples. 2. The breaking down of rocks; weathering and erosion and formation of soil in place and as alluvium. 3. The constituents of soil traced to their parent source in the rocks. 4. The texture of soil and permeation by water; surface and deep-seated springs. 5. The conversion of the minerals in the soil into plant foods; mineral manures and brak soils.

V.—FARM ENGINEERING, DAM CONSTRUCTION AND IRRIGATION.—By W. INGHAM, A.M.I.C.E., M.I.M.E., Hydraulic Engineer, Port Elizabeth Municipality. Three Lectures. SYLLABUS:—Rainfall, Evaporation and Absorption; Measurement of Water; Quantity of Water flowing off Catchment Area; Strength of Materials, Fencing; Design of Farm Buildings and Small Bridges; Farm Implements and Machinery; Pipes and Pipe Deliveries; Design and Delivery of Irrigation Channels; Windmills; Oil and Steam Engines; Suction Gas Plants; High and Low Lift Pumps; Bore Hole Pumps; Discharge of Bore Holes; Design and Construction of various kinds of Dams; Methods of Irrigation; Water required for different crops; Value of Water for Irrigation; Suitability of Soils; Light Railways; Cost of Buildings, Pumping Machinery, Dams, etc.; Government Loans for Irrigation Purposes.

VI.—LAW OF WATER AND WATER RIGHTS.—By Prof. W. A. MACFADYEN, M.A., LL.D., Professor of Law, Rhodes University College. Three Lectures. SYLLABUS:—1. Water as a Subject of Property.—Private Water; Water; Rain; Storm Water; Springs; Percolation; Catchment Areas; Private Dams. 2. Water as a Subject of Servitudes.—Furrows; Watercourses; Streams; Waterleading. 3. Dams and System of Irrigation in their Legal Aspect.—Discussion of recent changes in and further proposed reforms in the law.

VII.—DISEASES OF PLANTS.—By Professor S. SCHONLAND, M.A., Ph.D.,, Professor of Botany, Rhodes University College. Three Lectures, illustrated by Models, Drawings and Microscopical Preparations. SYLLABUS:—Nature of Plant-Diseases generally.—(*a*) Diseases produced by physical causes. (*b*) Diseases produced by parasites, (1) Animal parasites; (2) Vegetable parasites. The following parasites will be treated more in detail:—Dodder, Rust and Smut. The life-histories of these parasites were traced, and methods of dealing with them discussed.

VIII.—ECONOMIC ENTOMOLOGY—INSECTS AND INSECT CONTROL.—By W. R. DEWAR, Eastern Province Entomologist. Two Lectures, illustrated by Specimens. 1. General anatomy, classification, life-history and habits of insects. 2. The more important methods adopted for the prevention of injuries due to insect attack, with a consideration of Parasitic and Predacious Insects.

IX.—MECHANICS AND METEOROLOGY.—By Professor A. OGG, M.A., B.Sc., Ph.D., Professor of Physics and Applied Mathematics, Rhodes University College. Five Lectures, illustrated by Experiments. SYLLA-

BUS:--Force; Work; Energy; Power; Simple Machines, such as Crane, Levers, Balance, Pulleys, Steelyard, Screws; the transmission of Power by Belts and Toothed Wheels; Hydrostatic Pressure; Barometer; Measurements of height by Barometer; Suction, Force and Centrifugal Pumps; Syphons; the elementary principles of Meteorological Measurements.

X.—THE OSTRICH AND ITS FEATHERS.—By Professor J. E. DUERDEN, M.Sc., Ph.D., A.R.C.Sc., Professor of Zoology, Rhodes University College. Four Lectures, followed by practical work, consisting of examination of Specimens, Dissections, Microscopic Preparations, types of Feathers, Parasites. SYLLABUS:—The general character of Birds and comparison between running and flying Birds, as illustrated by the Fowl or Pigeon and the Ostrich; general account of the organs and bones of the Ostrich: the physiology, care and food of the Ostrich; embryology or development of the Ostrich within the egg; instincts and habits; principles of breeding applied to the Ostrich; the internal and external Parasites of the Ostrich and remedies. Feathers of Ostrich.—The different parts of a feather; the different kinds of feathers and their distribution over the body in feather-tracts; the four plumages—natal, chick, juvenal, adult; development and growth of a feather; clipping and quilling; relationship between growth and nutrition; defect in feathers—"bars," their cause and remedy.

XI.--MERINOES AND ANGORAS.—By C. J. LEE, President of Agricultural Union. Two Lectures, dealing with the Breeding and Grazing of Merinoes and Angoras, and points of interest and value in the Angora's fleece. Illustrated by fleece-bearing Angoras.

XII.—FARM SURVEYING AND LEVELLING.—By D. WILLIAMS, B.Sc., Assistant Lecturer in Mathematics, Rhodes University College. Two Lectures, with Demonstrations on use of Instruments

XIII.—THE MERINO SHEEP.—By T. T. HOOLE. One Lecture, on the Merino Sheep and the Breeds most suitable to the different South African conditions, with Demonstrations at Atherstone.

XIV.—FOOD SUPPLY, CROPS, SEEDS.—By Dr. ERIC A. NOBBS, Agricultural Assistant, Department of Agriculture. Five Lectures. SYLLABUS:—1. The Food Supply. 2. Farming Systems. 3. The Leading Crops, with notes on Tillage, Irrigation, Manuring, Treatment, Conservation, and Utilization. 4. New Crops. 5. Seed. 6. The Relationship of Soils and Crops.

XV. AGRICULTURAL ECONOMICS.—By P. J. HANNON, Superintendent of Co-operation. Five Lectures. SYLLABUS:—1. Introductory notes. Meaning of Economics, Application to Agriculture. Agents of Production. Land, Labour, Capital. Leading terms: Wealth, Money, Price, Value, Exchange, Free Trade, High Farming, Land Tenure, Supply, Demand. Law of Diminishing Returns. Statistical Basis for Study in South Africa. Physical Considerations. 2. Cost of Production. Cost of Transit. South African Markets—Competition. Over-sea Markets—Competition. Imports. Exports. Systematic Improvement. 3. Leading divisions of South African farming:—(a) Live-stock: 1. Wool and Mohair. 2. Meat. (b) Cereals: 1. Wheat. 2. Barley. 3. Oats and Rye. 4. Mealies. (c) Ostrich Farming. Economic questions involved. (d) Viticulture and Fruit. (e) Dairying and Incidental. (f) Tobacco. (g) Lucerne Cultivation. 4. Organisation:—(a) Co-operation in Purchase, Transit, Sale. (b) Improvement of Output. (c) Agencies for Distribution. (d) The Business Side of Agricultural Co-operation. (e) Companies' Act, 1892. (f) Government Loans. (g) Credit. 5. Relations between Agricultural and other Industries. Divisions of Industry. Organic, Extractive, Manufacturing, Commercial. Special considerations affecting South African development.

XVI.—FORESTRY.—By G. A. WILMOT, District Forest Officer, and Lecturer at the South African School of Forestry. Five Lectures. SYLLABUS:—1. Introductory. A general definition of what Forestry is, the objects of Forestry, and how its practice directly and indirectly benefits a community. 2. Foundations of Sylviculture. An elementary consideration of the chief factors which govern the growth of trees, viz., moisture, and soil. 3. Practice of Sylviculture. (*a*) The regeneration of Forests. (1) Artificial regeneration—nursery work, sowing and ploughing. (2) Natural regeneration. (*b*) The growth of trees in height and diameter. (*c*) The tending of Forests. (1) Cleanings. (2) Thinnings. 4. Mensuration and management. The measurement of the forest crop and the calculation of its present and future value. 5. Forest Utilization. Some methods of exploiting forest produce. (1) The major products. (2) The minor products. 6. Forest Protection. Protection against:—(*a*) Fire; (*b*) Animals; (*c*) Man.

XVII.—THE PRINCIPLES OF DAIRYING AND POULTRY FARMING.—By R. SILVA JONES, Government Dairy Expert. Three Lectures, illustrated by specimens and diagrams. SYLLABUS:—1. Milk, its composition and variation in quantity and quality. 2. The principles underlying contamination of Dairy Products. 3. The production of Butter and Cheese from milk and cream; method of milk and cream testing. 4. Poultry—Breeding and treatment in health and disease; their digestive organs. Incubators—the principles of construction and management. Eggs—the structure and formation of the various parts; varieties of eggs. Chickens—their treatment in health and disease.

XVIII.—FRUIT CULTURE.—By HARRY H. HARDS, Sunnyside, Grahamstown; President E.P. Board of Horticulture. One Lecture with Demonstrations at Sunnyside. SYLLABUS:—1. Introductory. 2. Climatic Conditions. 3. Soil: Suitability, preparation, manuring. 4. Orchard: Position, laying out, distance of trees apart, wind screens, cultivation. 5. Trees: Selection, age, stock, planting. 6. Pruning: Generally, apple, pear, apricot, peach, plum, summer. 7. Diseases and Pests: The enemies of the orchard. 8. Fruit: Thinning, when it should be on the tree, picking, grading, packing for export and S.A. markets. 9. Orchard Work at Sunnyside: Demonstration on methods of grafting and pruning; also packing and general inspection of the system of fruit-growing there.

LECTURE No. 1.

MERINO SHEEP AND BREEDS MOST SUITABLE TO THE DIFFERENT SOUTH AFRICAN CONDITIONS.*

(By Mr. T. T. HOOLE, Atherstone, Albany.)

The origin of our domestic sheep is, to a great extent, unknown. Darwin admits that he could form no opinion, but naturalists are agreed to ascribe its origin to the Moufflon, or the Argali, the wild sheep of Central Asia. The earliest records of Egypt prove that sheep abounded in that

* These notes represent only a portion of what was actually delivered. The writer is indebted to "Bruni," "The Pastoralist Review," and "The African Monthly," for most of the facts regarding the early history of the Merino. The lecture was followed by a demonstration on the Merino Flock at Atherstone.

country, and representations of them are met with on most of the ancient monuments.

The skill of the ancient Egyptians in the art of weaving was remarkable, and the machinery of the present day has not hitherto produced the same delicacy of texture and variety of pattern. One authority says: "It is certain that the domestic animals did not originate in Europe, but were domesticated in Central Asia, which was the home of their wild ancestors; and moreover they were not introduced into Europe gradually, one by one, but suddenly and *en masse*. It can be proved that the Aryans introduced sheep and other domestic animals into Europe, when they over-ran that country." The Greeks were certainly pastmasters in the art of sheep raising, and gave great attention and care to the production of fine wool fleeces, and the selection of the best sires. Their rams occasionally realized as high as £250.

Unfortunately, owing to artificial methods and pampering, these splendid flocks were unable to withstand the rough treatment to which they were subjected during the years of war which followed, and practically ceased to exist, owing to their enfeebled constitutions. The Phœnicians and Carthaginians must be credited with introducing the fine wool sheep into Spain—possibly about 1100 B.C. Mago the Carthaginian wrote several treatises on agriculture, and may be considered the father of husbandry. "Under the Arabs, Spain advanced to the front rank in agricultural pursuits," "Bruni" says. "In their hands the fine wool industry was brought to a very high standard of excellence, and the Merino sheep appears to us as the result of intelligent selection, followed up by all the possessors of the land, under the inspiration of the same idea, namely, that of the production of fine wool."

The term "Merino" is supposed to signify wandering, and was originally the name of an Arab tribe. For centuries the Merino sheep thrived in Spain, and for a long period was one of the chief sources of revenue to the Government, as all the most celebrated flocks belonged to the Crown. The principal cavanas were the Negrette, Paular, and the Escurial, which were each composed of 10,000 sheep, and were sub-divided into ten tribes or divisions of one thousand each. The wool from the above-mentioned cavanas was not allowed to leave Spain, but was used at the Royal manufactory. These migratory flocks were called "Transhermartes," and were taken from the plains to the mountains yearly, a distance of 400 miles, which was accomplished in six or seven weeks. This system of migration was controlled by a powerful tribunal called the "Mesta," and entailed great injury to local cultivation and flocks, proprietors being obliged to leave a path of 84 yards for the convenience of the travelling flocks. The same method of management was continued up to the period of the Peninsular war, when, owing to neglect and privation, the Spanish sheep became so miserable and undersized as to be quite worthless. "Bruni" says: "Thus, after a glorious existence of 25 centuries, the Spanish sheep were known no longer to that country—but, though lost to Spain, they were not lost to the world. Henceforth it is in other countries than Spain we must trace the history of the Merino breed of sheep."

Fortunately, previous to the disappearance of the Spanish flocks, large shipments had been made to the different European Governments and America, and it is with these flocks that the sheep farmer of to-day is chiefly interested.

The principal flocks were distributed as follows:—

(1) *Saxony.*—Received sheep from the Negrette and Escurial Cavanas.

(2) *France.*—Selections from the finest flocks in Spain, from which the Rambouillet flock was founded in 1786.

(3) *America.*—200 sheep selected from Escurial Cavana in 1809, and large shipments later.

(4) *England.*—King George III., in 1791, purchased a small lot of choice Negrettes. These were the foundation of the Kew flock, and in 1808, 2,000 merinos were received from the Paular Cavana.

We now come to the importation of the Merino into Australia, and it is an extraordinary fact that the first sheep introduced into that country should have been purchased at the Cape in 1797. It is acknowledged that in 1793 the Van Reenan's and Breda's were in possession of pure Merino sheep of the Saxony type. These sheep were sold, on arrival in Australia, to Mr. Wm. Cox and Capt. MacArthur, of Camden, and may be considered the foundation of the Australian Merino. In addition to the sheep received from the Cape, Capt. MacArthur, in 1804, purchased from the Royal flock at Kew a few choice sheep; shortly after which Mr. Thomas Henty forwarded another consignment from the flock of King George III.

The above particulars show that at a very early period Australia was in possession of the pure-bred Merino sheep from the celebrated Negrette and Paular Cavanas. It is greatly to the credit of these early pioneers that they not only maintained the excellence of the Spanish Merino, but, owing to their skill and perseverance, aided by the suitability of the country, produced an animal in every respect superior to the far-famed Merino of Spain. As an instance in point I will quote from the excellent article in the *African Monthly*, by Harrowell: "From the stud-breeders originated the great improvement in the Australian flocks. By means of careful selection they have increased the weight of fleeces of stud rams from 12½ lbs. to sometimes over 40 lbs., and this increase has reacted throughout the country. Old 'Sir Thomas,' one of the ancestors of the famous ram 'President,' cut 12¼ lbs.; 'President' cut 22 lbs.; and 'Patron,' the present notable descendant of 'Sir Thomas,' cut somewhere about 34 lbs. This is a wonderful achievement, because it was done by selection alone; no outside strain was introduced."

The result is that Australia to-day holds the proud position of being the largest producer of high-class wool in the world. I need only tell you that during the years of drought from 1894 to 1903, the flocks of Australia decreased from 100,000,000 to 56,810,000. But in four years of prosperity the increase has once more brought the total up to nearly 80,000,000, and the estimated value of wool shipped for ten months to the end of April, 1907, has realized the record total of £29,000,000 nett. These marvellous increases have placed the country in a sound financial position, and demonstrates what the golden fleece has done for the Australian Commonwealth.

Owing to the success of the first importations, further shipments followed, which were distributed throughout Tasmania, Victoria, and New South Wales. Enormous difficulties had to be contended with, and the Australian squatter had still to learn what particular breeds were suited to different localities. We are now reaping the benefit of their experience, and as a result find the following types, which, although all pure Merinos and descended from the original Spanish breeds, have been evolved by the different conditions of climate and pasturage, guided by the skill of the breeder: —

(1) *The Tasmanian.*—The most handsome of all the different types, and the most profitable where wool production is the principal object in view. Their heavy fleeces of pure, lustrous wool are the envy of all sheep-breeders.

(2) *The Australian Merino.*—A large, plain-bodied sheep, with a few well-developed folds, of the Rambouillet type, with a grand constitution, carrying a fleece of average weight, with long staple, medium quality wool.

(3) *The Vermont.*—This breed has been introduced into all parts of the Commonwealth, and has been principally used in flocks wanting in density. The original shipments from America were, according to "Bruni," "lacking in quality." In many cases they carry very heavy fleeces, largely impregnated with yolk. The Australian Vermont has greatly improved in size, constitution and quality of fleece, and is considered a superior animal to the original importation."

(4) *Mudgee Sheep.*—Described by Harrowell as "fairly plain in body, with few wrinkles, though good folds; having short clothing fleeces, with character well pronounced."

(5) *Western Victorian Sheep.*—"Plain in body, carrying a long staple of magnificent fine wool."

I have now touched on some of the principal types of the Merino of Australia, as it is to this country, whose climatic conditions so closely resemble our own, that we must in the future chiefly look for fresh blood to establish and replenish our flocks. Let us now study the question from a South African sheep farmer's point of view. The most important point is the selection of the right type of Merino, suitable to the locality. Climate, altitude, and pasturage are all important factors in the selection of the breed required. It is a fatal mistake to imagine that it is possible, with advantage, to transgress the laws of Nature. A noted scientist says: "Nature can be controlled by being obeyed" On this principle, it would be disastrous to attempt to introduce a breed of sheep from a cold country, with a good rainfall, and consequently luxuriant pasturage, to districts similar to the Karoo, possessing a dry, hot climate and scanty vegetation.

The Tasmanian type is essentially suited to our grass veld districts, with its heavy herbage and good rainfall, but it is particularly noticeable, at the Sydney ram sales, that although the Tasmanian is greatly admired, and, together with the Vermont, secures all the principal prizes, they are not generally in demand in New South Wales, owing to its dissimilar climate, that of New South Wales being much hotter and drier. The highest prices have of late years been paid for a large, plain-bodied sheep, with a long staple of medium quality wool, which I have already described as the Australian Merino type. Although hardly a show sheep, this class of animal is, to my mind, what is required for the dry, hot districts. It does not carry a particularly heavy fleece, but, as a commercial sheep, it possesses a combination of qualities—heavy carcase, a long staple of profitable wool, free from excessive yolk, and, most important of all, a grand constitution, capable of thriving without artificial feeding even during severe drought.

It is impossible in a short paper to deal with all the important points of breeding, but it is a recognised fact that only one in a thousand has the capabilities or natural instinct requisite to a successful breeder. A love of the study and years of experience in selection and mating are necessary, and, above all, perseverance in the production of an ideal. The Merino is most susceptible of improvement, but an error of judgment may possibly undo what it has taken years to establish. It may be considered easy to breed by selection to an ideal, but the difficulty is to establish an even type and maintain it.

I have not touched on the subject of "In-and-in-breeding," "Cross-breeding," "Heredity," and other matters of great interest to the sheep farmer; time will not permit.

I wish to impress on you once more the fact that practically there are only two great variations of country in South Africa, namely Karoo and

grass veld. On the former a large carcase animal, plain-bodied with medium quality wool, sound back, and average weight of fleece would be a profitable class of sheep to produce. On the grass veld, a medium-sized sheep, with a dense, heavy fleece of fine staple wool.

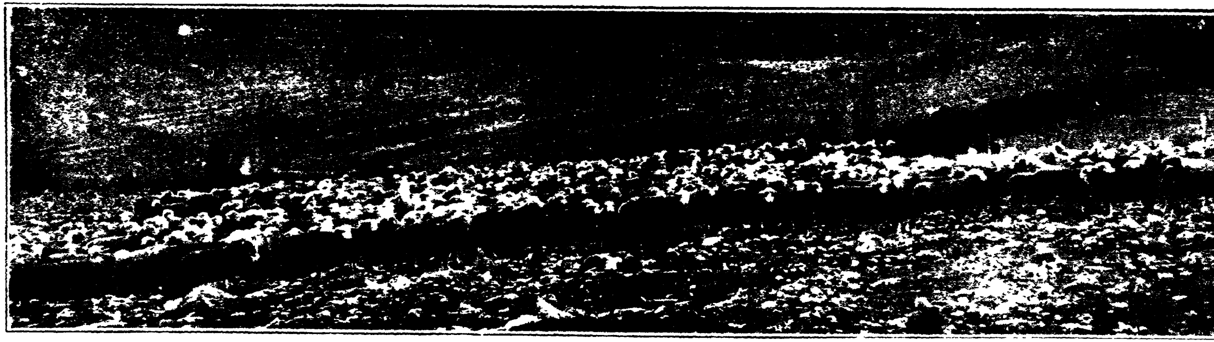
We have undoubtedly in this country some splendid specimens of the pure Merino, flocks that have been established for thirty or forty years. These studs are certainly a great credit to South Africa, but what we require is greater uniformity, and a unanimous verdict as to the best class suited to the different conditions existing. A decision should be arrived at by competent breeders as to the type best suited, from a commercial point of view, to the grass veld districts; and in the same way, the best type of sheep suited to the Karoo Districts. If this were possible, it would give a greater uniformity of fleece, and remove the stigma that our shipments of wool to the European markets are nothing more than a series of samples. At present each district produces at least half-a-dozen classes of wool, which fully justifies the censure.

There is no doubt that Agricultural Shows have in the past been very beneficial to the Merino industry, but they have not given sufficient encouragement to the production of the best commercial sheep off the pasturage. Under the present conditions, farmers are too apt to regard their sheep from a merely show point of view, which, although an excellent advertisement, tends to the production of an artificial animal, instead of a hardy, profitable sheep.

I may point to the bad effect that excessive artificial feeding, blanketing, and housing has on the constitution. It is not only one of the chief causes of sterility, but is instrumental in producing a delicate, unprofitable progeny.

The question of wrinkles and folds in sheep has led to a great deal of controversy, but must be considered entirely from two different standpoints, namely, the stud-breeders and the flock-owners. The former finds it necessary to produce a sire of a somewhat exaggerated type, owing to the tendency, in the Merino, to deteriorate, and unless this principle was adopted, flocks would in time lose their profitable characteristics. The flock-owner—or the owner of large flocks—requires a sheep capable of withstanding severe drought, active, a good fattener and breeder, in fact, a profitable, general-purpose animal, and although it will be necessary for him to avoid extremes, he will be obliged to introduce the progeny of the exaggerated type of stud ram, possibly in a modified form, to correct the deterioration I have already alluded to.

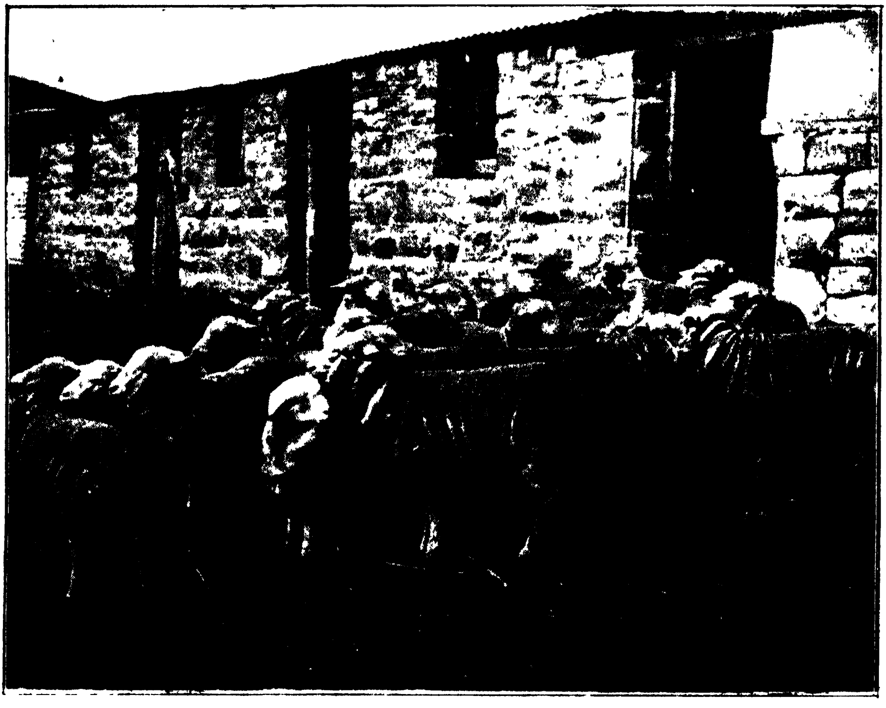
Breeding must be consistent; it is impossible to produce a flock of large-bodied, active, good-conditioned sheep, with long staple, combining density and fine wool. To expect size of carcase with extreme weight of fleece would certainly end in disappointment; and in the same way, extreme length of staple and density is rarely found on the same animal. Therefore, it must always be borne in mind that it is impossible in one animal to produce the utmost development in all directions. Either the carcase is increased, at the expense of the wool, or the extreme quantity and quality of fleece, to the detriment of the carcase. This is expressed by the law of correlation, by which we mean that when any part of the body attains a very high degree of development, certain other parts stop short of their ordinary state of evolution.



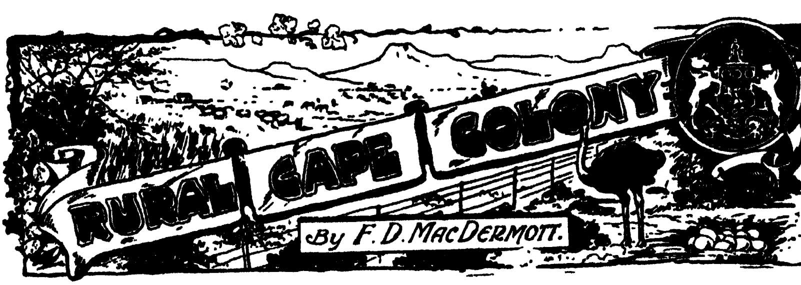
Portion of the "Highland Home" Stud Flock

Group of Selected Young Stud Rams at "Highland Home."

THE HOMESTEAD—"HIGHLAND HOME."



GROUP OF SELECTED YOUNG STUD EWES AT "HIGHLAND HOME."



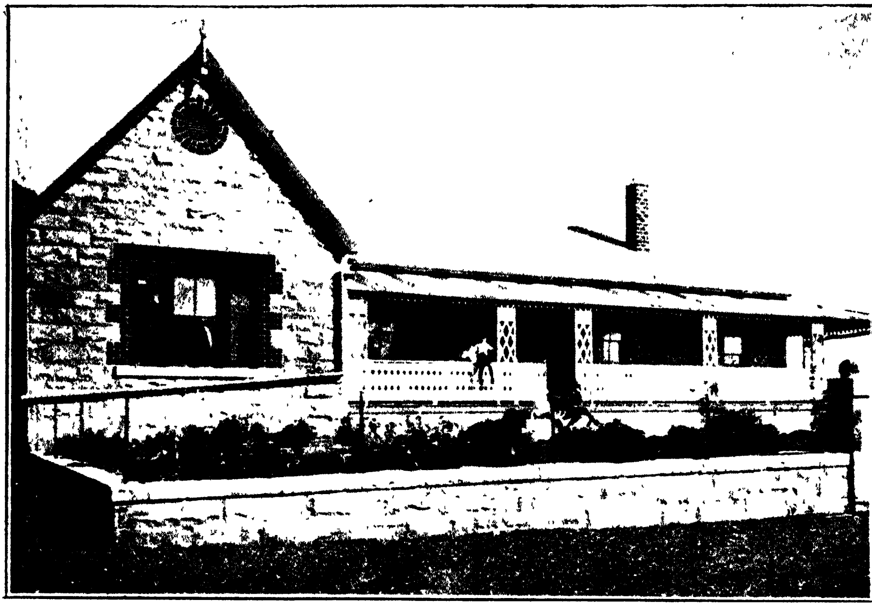
No. XXVII.

IN THE DISTRICT OF TARKA.

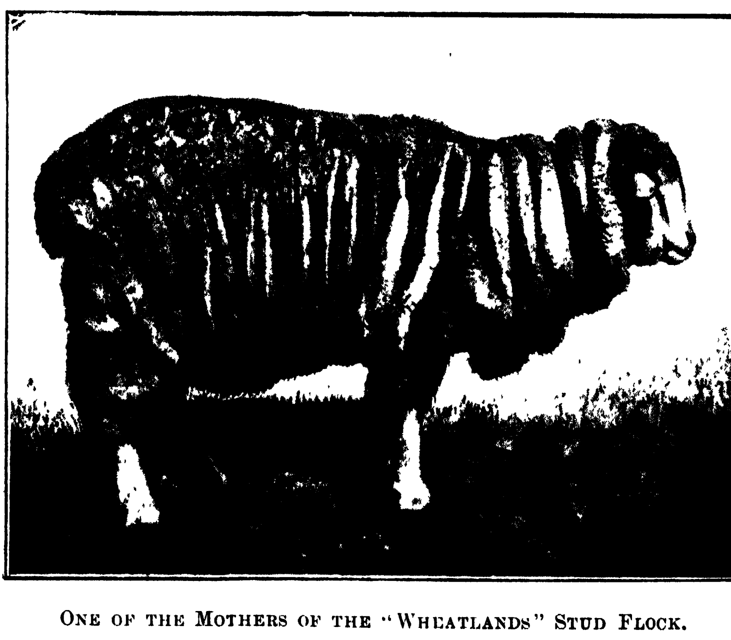
There is a good deal of similarity about the Upper Districts of the Cape Colony, more particularly as regards the general topographical features, and the only differences that occur are those which are mainly traceable to the slight variations in climate. In this respect the Tarka District has several features which are sufficient to differentiate it from those districts upon which it immediately impinges. Its altitude, for one thing, gives it a climate which brings a winter of great severity in some seasons, and in all may generally be calculated to be more or less "bracing." The proximity of several mountain ranges, including the Great Winterberg on the South, has also to be considered, for to these are due a fair average rainfall—that is, for a semi-arid section. In the severe winters, too, this district has a fair proportion of snow, which has the advantage of keeping the moisture on the land, instead of allowing it to run off with the rapidity which usually characterises the greater proportion of this country. The district itself may be divided, for agricultural purposes, into sections, according to the altitude at which the farms are situated. And as these altitudes vary from something like 4,000 to nearly 5,000 feet above sea-level, these divisions are sharply defined in many cases. The general aspect of the district varies from the undulating flats which characterise the lower sections, mainly those on the Queen's Town side of the district, to the sharply-defined mountain sections of the upper portions on the slopes of the Little and Great Winterberg, in the direction of the Bedford District. On the lower side the Zwart Kei River, which rises in the Winterberg, is the great factor in all agricultural enterprise, and along the valley through which this stream runs some of the most successful farming in the district is carried on. This valley at one time was largely devoted to cereals, but with the recent advances of stock-farming—mainly sheep and cattle—the older methods are gradually being displaced, and wherever possible—that is, where irrigation waters from the river or its tributaries are available—permanent pastures, in the shape of lucerne, are being laid down, much to the advantage of the farmers and the district generally. The cultiva-

tion of this valuable fodder plant is gradually spreading in other parts of the district, but in none to so marked a degree as along the banks of the Zwart Kei, a fact which is not so very remarkable when all the conditions are taken into consideration. The river soil in this valley is very suitable for this crop, and in addition the water supply is fairly regular, while in many places the water can be led out of the river without very great difficulty. The mountain farms have their own special advantages, but they do not include those which make the lot of the Zwart Kei farmers comparatively easy. But even in these parts of the district a good deal of irrigation is carried on, the mountain streams being utilised and turned over the lands wherever the opportunity offers. In good seasons such as those the whole country has been recently enjoying, irrigation is not practised to so large an extent, for the rainfall has been so heavy as to do away with the necessity for anything beyond an occasional watering to induce growth for an extra crop. But in normal seasons the farmers have to rely to a large extent on irrigation, especially for their lucerne. Most of the cereal crops are grown without irrigation. Mealies are cultivated to a large extent, and, being a summer crop, generally give good returns.

It is not easy, in the course of a flying visit like that I was compelled to pay to this district, owing to pressure on my time, to do anything like justice to the energy and enterprise which has brought this somewhat out-of-the-way section well to the fore in agricultural circles during the past few years. In fact, it was only in fulfilment of a long neglected engagement to visit some of the more prominent stud-breeders of the lower Winterberg that I managed to get time to see even a portion of this interesting section. And once there I felt that I could have stayed at least a week longer, had I had that much time to spare, in profitable study of the agricultural and pastoral industries which have been so successfully developed. Unfortunately, my time was strictly limited, and I could only take a comparatively small section of the district into view. Starting from Tarkastad, I left the township almost immediately after the arrival of the train, and at once headed towards the Winterberg. The roads were heavy and greasy from rains which had fallen during the night, and as this country is a little steep at the best of times, our progress was not very rapid. After leaving Tarkastad we made for Amandelhoogte, a fine height that gives a splendid view of a large section of the country hereabouts. In the hollow at our feet as we wound up this rather steep ascent lies the farm Oudekraal, belonging to one of the Goosen family. This is very prettily situated in a well-sheltered valley, and looks as though some day it will figure prominently, when all its natural advantages are fully developed. Crossing Amandelhoogte the road descends into a wide valley, which opens out as a fairly level flat, through which runs a turbid looking river, rejoicing in the local appellation of the "Bottelgat." In passing through the drift one gets a fairly good idea of the nature of the soil, which seems to be a deep, dark loam, with a clay sub-soil, in which almost any crop should thrive. It thins off as one gets away from the valley bottoms, but on visiting higher ground later on I found a good depth of soil there as well, so that very little room is left for complaint on that score. A substantial looking farm lies close to the river banks, which is owned by Mrs. Levey, and is largely devoted to merino sheep and cereals, so far as I could judge from driving through. From here onwards this flat runs for several miles until it converges towards the higher ground, which seems to form the foothills of the Winterberg. On getting towards this part the first indications of the methods of the mountain farmers came into view. From the valleys, which run down like Scottish glens from the Highlands, small but fairly constant streams flow to the lower ground, and on the banks of these streams, comfortably sheltered from the worst of the inclemencies of the winter seasons, many interesting farms are situated. Here the methods

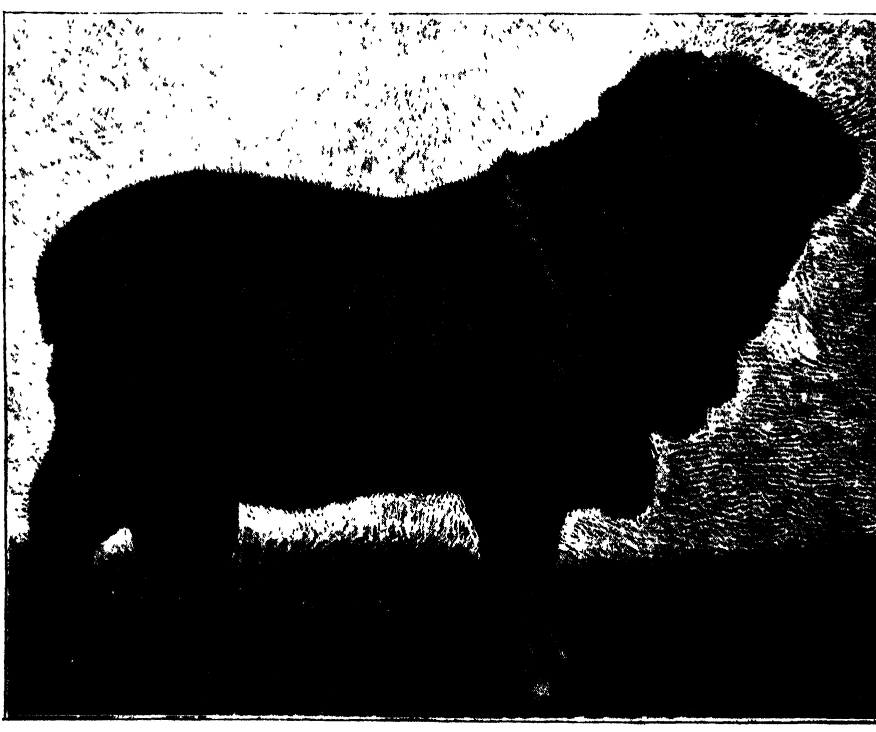


MR. NEWTON KING'S HOMESTEAD AT "WHEATLANDS."



ONE OF THE MOTHERS OF THE "WHEATLANDS" STUD FLOCK.

STUD EWES AND THE RAM "MONARCH" AT "WHEATLANDS."



"NAP,"
The Recently Imported Franco-American Ram at "Wheatlands."

of the irrigator are brought into practice, and for some miles one can drive through cultivated lands, mostly laid down to lucerne, which speak in eloquent terms of the enterprise and foresight of the farmers. Passing beyond the property of Mr. Fergus, we came to that of Dr. Goddard, a young medical practitioner who has taken to agriculture. Here the lucerne lands are quite the feature of the landscape, and as we drove along I counted no fewer than nineteen huge stacks of lucerne hay awaiting a market—or, what should be more to the point, sufficient stock to consume them. Like so many other parts of these sections, the production of this crop seems to have outstripped the capacity for utilising it in situ. Or else the energies of the farmers have been so undividedly concentrated on the permanent improvement of their farms, that they have not as yet had time to consider the more important question as what they shall do with the crops when they are raised. One of the causes to which this kind of thing is traceable is, of course, the abnormal conditions which have prevailed in the country for some years past. While it was possible to carry on such development works as the construction of weirs, the levelling of land and the laying out of furrows, the stock of the country, from one cause and another, was rapidly depleted. During the hostilities, too, this part of the Colony was subjected to more than its fair share of the general troubles, and it will take some years yet to bring the stock conditions back to those of the pre-war days. But, allowing for all this, and for the uncertainty which followed on the disturbed period, it is difficult to imagine why some practical steps have not been taken before now for disposing of such huge supplies of fodder. The fact seems to be that our animal industries are not yet sufficiently advanced to encourage the farmer to stock up to the full extent of the feeding capacity of his enhanced supplies. Hitherto lucerne has been looked upon largely as a luxury, for which high prices could be obtained in the markets or else kept for such highly-remunerative industries as ostrich-feather raising. But with the enormous increase in production, the day must be close at hand when the stock-farmer will realise that this exceedingly valuable fodder-crop can be utilised just as effectually and more economically in the shape of meat, dairying, and other animal products. Before this view of the uses of lucerne can become popular and be brought into general practice, some of the most cherished traditions of South African farming will have to be revised, if not abandoned altogether. Among the first of these is that which is held so extensively, that stock generally should thrive on the natural pastures, unaided by supplementary feed. In other parts of the world lucerne raised animal products form an important proportion of the animal industries, and if we had not had the ostrich we should long ago have learned that valuable lesson here. But all this is by-the-way.

Mr. John Henry King's Farm, "Highland Home."

After winding through the narrow valley above Dr. Goddard's farm, and passing another property which has also a good deal of irrigable land watered by the same stream, we arrived at the homestead of Mr. John Henry King, "Highland Home." Mr. J. H. King is so well known throughout the length and breadth of this Colony, and in many parts beyond our borders, that it is quite unnecessary to introduce him to our readers. Those who have not met him in the leading showyards of the Colony know him by repute, that is if they take any interest in the Merino sheep. His triumphs and records year after year as a breeder of fine-woolled sheep have made a name for him which will last for many years to come, even though he were to cease his labours in that particular groove and turn his attention for the rest of his life to some other occupation. But as that is not likely to happen, we may look upon Mr. J. H.

King as destined to leave his impress upon the sheep-breeding industry of this country. Whatever his critics may have to say of him or his methods, none can accuse him of want of enthusiasm. In fact, it would be difficult to find a more enthusiastic devotee of any particular form of agricultural industry. His sheep are the breath of his nostrils, and without them he would be lost indeed.

"Highland Home" is a farm that, judging by appearances, may be taken as fairly typical of most that is best in the mountain sections. It is probably better than the majority of those situated higher up the range, but is so complete in itself, and seems so well suited to the particular uses to which it is devoted, that a fairly full description cannot be out of place. It is situated on the lower spurs of the range, with sufficient arable land in a narrow valley, where the homestead is built, to provide a goodly supply of fodder in case of necessity. The natural pastures are good in fair seasons, being largely grass of a good quality. The great value of this property, however, is the large extent of good mountain veld which it contains. Nothing could be better for sheep, and after visiting the farm one cannot be at all surprised at the success which Mr. King has scored with his stud flock.

The homestead, as will be seen in the illustrations herewith, is a substantially constructed building, plainly but comfortably built, and, after all, comfort must be the first consideration in such a climate as this is for a large part of the year. Extensive outbuildings, kraals and shedding for the stock, are situated a little higher up the valley, and the whole is so sheltered by trees, principally poplars and a few macrocarpa, that it is not easy to get a comprehensive view of it. The water supply for the irrigable lands, which stretch away in the broader part of the valley below the homestead, comes down from the higher ground in the narrower portions of the valley above, and though the stream was running strong when I was there, I was told that there have been times when it gets very weak indeed. But any deficiency in this direction must be made up by the mountain mists which gather regularly in these parts, so that drought, as it is understood in the Karoo, the parching, perishing, exhausting variety, which carries off everything, is comparatively unknown.

It is a common remark among sheep men in this Colony that our stud-breeders do not carry sufficient stock of the type, or anything approaching the type, of those that take the majority of the prizes at shows. This accusation cannot be justly laid against Mr. J. H. King, for his stud flocks are quite a pleasing sight to see. For my benefit Mr. King brought in several fine flocks, which would compare, for uniformity and general excellence, with anything this Colony can produce. Of course, he has to make his selections for stud purposes, like any other breeder, and these were shown to me "in the making," as it were. I took the opportunity of photographing as many of these as I conveniently could reproduce, and the results, herewith, speak for themselves.

The family record of Mr. J. H. King's flock goes back a good many years. Like his cousins, known under the name of Geo. King and Sons, and Mr. T. W. King, of Kingsvale, Bedford, he has been breeding consistently on certain defined lines. Starting with some of the old French strain of Rambouillet, certain modifications and infusions have been introduced, with the ultimate object of producing a sheep which shall prove economically suitable for South African conditions. Like most efforts in such a direction it has not been a task of ease. Many disappointments have been encountered, but, as I remarked before, Mr. King is an enthusiast on sheep, and there is no reason whatever why he should not succeed in establishing flocks which will come up to his most sanguine expectations. Time alone can give the verdict in such a case. The present stud is still largely of the Rambouillet type, with an infusion of the better class of what

WHEATLANDS RAM AT 18 MONTHS OLD. 1st in the Class for Registered Sires at Port Elizabeth 1907, and 1st and Champion at Graham's Town, 1906-7.

"GOLDFINDER III."
The Tasmanian Ram recently Imported by Messrs. C. Adams & Son of Springfield.

Group of Stud Ewes at Wheatlands with the Ram "Model."

we know as Vermont. Mr. King's is the South African ideal of a sheep. He wants to produce a good carcase as well as a good fleece, and in that laudable endeavour will always have the best wishes of the majority of his fellow sheep farmers.

The "Highland Home" Flock.

The origin of the "Highland Home" flock is traceable to the District of Bedford, the earlier members being from the Kingsvale flock in that district. The Kingsvale flock was established in 1852 by the late Francis and T. W. King, and was composed of Spanish Merinos originally owned by Messrs. Griffiths and Daniels, which were imported at different periods from 1830 to 1837. Later on Messrs. F. and G. King purchased from Wood Bros., Grahamstown, forty ewes and one ram, imported Josephine Merinoes from the Imperial flock of France. From that date until 1872 imported Rambouillet rams were used in this flock, when Messrs. King dissolved partnership and divided the flock. The same methods of breeding were continued until 1881, when the management of Kingsvale fell into the the hands of Mr. T. W. King. He bred from rams selected from the flock until 1890, when he purchased from the estate of J. J. Irving, of "Waterford," in the District of Stutterheim, the pure-bred Tasmanian ram "Sir Thomas IV," which was then introduced into the flock. The imported Tasmanian ram "Eskvale" was also used. It was after this, in 1895, that Mr. J H. King started his flock with ewes purchased from the Kingsvale flock. He, however, introduced further new blood, in the form of Vermonts, through which he graded the whole of his stud to suit his own ideals. He has bred mostly from selected sires and ewes of his own rearing, and is thus in the position to form more and more accurate ideas as the years go on as to which of the selected animals he uses are most likely to fulfill his expectations. Among his earlier introductions, and subsequent most successful sires, were: "Sam I," out of imported registered Vermont sire and dam; "Yankee I," by "Sam," out of Highland Home special stud ewe; "Sam II," by "Yankee I," out of Highland Home special stud ewe; "King Tom," by "Sam II"; "Billy," by "Sam II"; "Yankee II," by "Yankee I"; "Golden Hoof," by "Yankee II"; "All Wool," by "King Tom"; "Pat," by "Billy"; "Jack," by "All Wool"; "Dick," by "King Tom"; "Model," by "Pat"; and "Captain," by "Pat." The stud flock, according to the S.A. Stud Book, now consists of three rams, "Model," by Pat," "Dick," by "King Tom," and "Bismarck," together with thirty-six selected ewes, numbered from 1 to 36, and earmarked from E16 to E36.

Messrs. Geo. King & Sons at "Wheatlands."

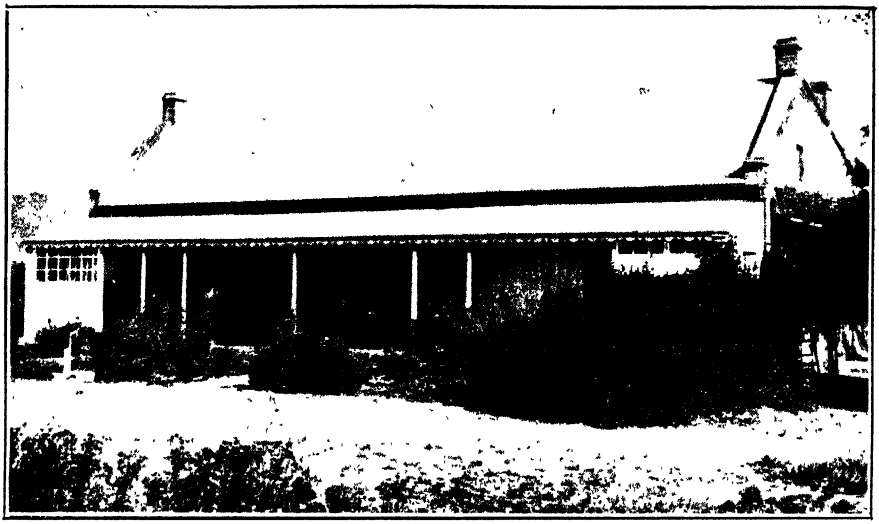
After leaving "Highland Home" I next managed to get as far as "Wheatlands," the well-known farm of Messrs. Geo. King and Sons. This firm originated in the Bedford District, where they still have large holdings managed by other members of the family. These have been described in previous issues. To reach "Wheatlands" from "Highland Home" one has to go back on one's tracks for a good distance, and then cross a rather prominent rise known as Vogelstruis Nek. There is a post and telegraph office here, as well as a store, so that this place has quite an air of importance. A rather steep descent into a wide valley, and we are at "Wheatlands." As the name implies, this farm was at one time noted for its grain production, but that is gradually changing, and now the arable lands are being brought under lucerne. The old homestead, a view of which is given herewith, lies to the right of the road, and is surrounded by well-laid-out arable lands, which are irrigable from a strong spring which rises on the hillside above. The comparatively barren appearance of the surroundings is relieved by a few trees which are planted about the homestead, but

the raising of trees is a difficult matter at these altitudes. Mr. Wilberforce King and his family occupy the old homestead, and Mr. Newton King, another member of the firm, who assists in the management here, has built a modern dwelling-house higher up on the mountain side. A view of this is also shown herewith. All the buildings are substantially constructed of stone, of which there is a good supply obtainable. Even the sheds and kraals are built of the same sound material.

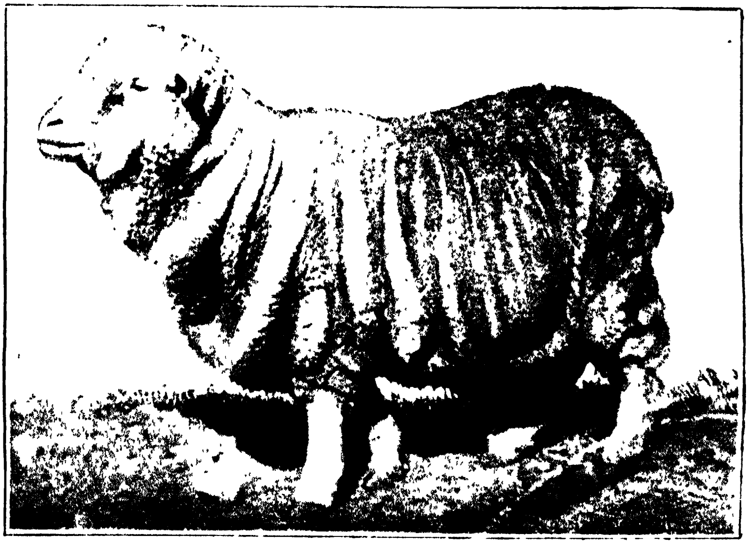
As at "Highland Home," the great interest at this farm is the stud flock of Merinoes so well known on the showyards. This flock was originally established by the late Messrs. F. and G. King, of Elizabeth Farm, Bedford, C.C., as far back as 1853. On dissolving partnership in 1872, one-half of this stud flock was taken over by Messrs. Geo. King and Sons. Their share consisted of one imported Josephine ram and sixty-one pure-bred Spanish Merino ewes, the latter having been bought off Messrs. G. Joseph and Caldecott, then farming at Colk's Kraal, Fish River. These were from ewes originally imported from the Sturgeon flock in 1865, and two imported rams, though Messrs. Griffiths imported their first Merinoes as far back as 1835. Up to 1878 Messrs. Geo. King and Sons kept strictly to the French type, and introduced several very excellent Rambouillet rams and a number of ewes to the flock. In 1879, however, they purchased two Sturgeon rams imported by the late John Webb, of Grahamstown. The next introduction of importance was the purchase in 1891 of an imported pure-bred Tasmanian ram, "Premier," bred by Robt. Viney. This ram proved a noted sire, his progeny taking many prizes at shows in this Colony. Their next step was to import in 1893 a Tasmanian ram direct from Robt Viney. This ram was by "Woolly Tom," by "Golden Horn," by "Sir Thomas II," by old "Sir Thomas." In 1896 further introduction of Tasmanian blood was made, in the shape of two rams bred by Thomas Gibson; these were by the champion ram "Silver King," by "King William," by old "Sir Thomas." In 1899 they began to use their own rams, having now a well-established stud founded on some of the best blood in the world. Among the rams used with success during this period was "Confidence," bred by themselves, out of pure imported Tasmanians; "President" and "Sanford," bred by themselves from imported Tasmanian ram and special stud ewes by "Premier"; "French" and "Buller," by "King Tom," a noted sire bred by J. H. King, out of special stud ewes "May Blossom" and "Topsy." In 1903 further changes were made by the introduction of Vermont blood. In that year Geo. King and Sons purchased two imported Vermont rams The one was bred by F. Bayly, "Gorham," sire "Gorham's Dudley." The other was bred by E. Peck and Sons. The stud, as entered in the Stud Book, now comprises the following rams: "Model," by "French"; "Monarch," by "Gorham," ex "Topsy"; "Woolly Bill," by "Ray," imported Vermont; "Kaiser," by "Ray"; "Rhodes," by "Ray"; and the latest addition in the shape of "Nap," an imported Franco-American landed here in November last. "Nap" is 3½ years old, and was bred by C. R. Parsons, of Saline, Michigan, U.S.A., from Eager's flock, of Henell, Michigan. The latter does not appear in the last issue of the S.A. Stud Book.

From the above particulars readers will be able to trace for themselves the evolution of the stud which takes such a prominent place on the leading agricultural shows of this Colony, and they also give some idea of the time and care necessary to the building up of such flocks. It is a little unfortunate that at the time of my visit all the sheep were shorn, and in going through the illustrations herewith allowance must be made for that. This remark applies also to the "Highland Home" sheep.

It must not be supposed that because sheep are the prominent feature of these notes, that these farms produce nothing else. Goodly troops of cattle are kept, and a good deal is done in dairying, while general crops

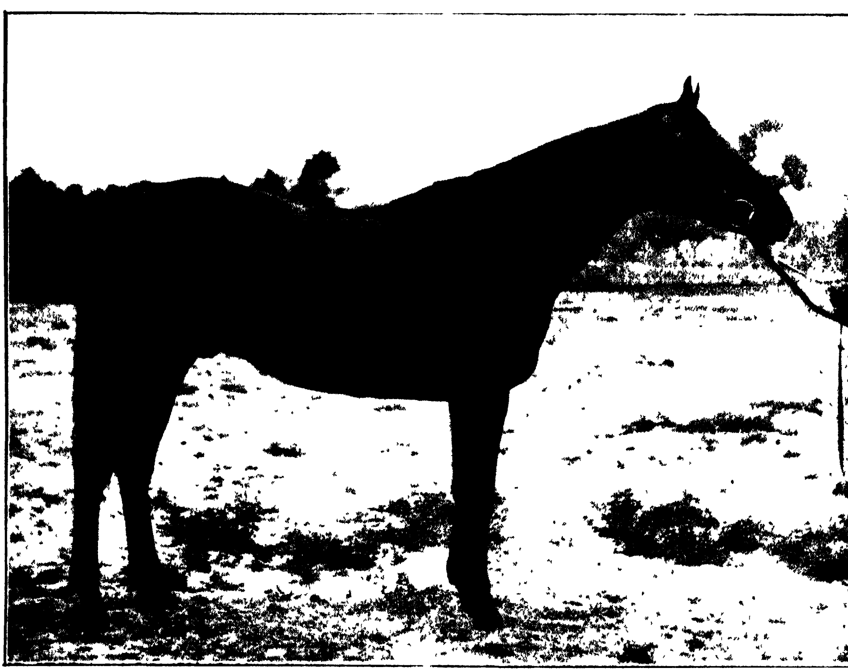


THE OLD HOMESTEAD AT "WHEATLANDS



A NOTED PRIZE WINNING EWE AT "WHEATLANDS."

WHEATLANDS STUD SHEEP



"COMMONER," THE THOROUGHBRED HORSE MENTIONED IN "FARM AND VELD" IN THIS ISSUE.

are raised on a fairly large scale. Geo. King and Sons always have good horses, but the breeding is not done here. They are also noted for very fine Angoras, but these are kept at the other farms. They have another farm high up on the Winterberg, "Ventnor," which I had not time to visit.

Messrs. C. Adams and Son's Stud Sheep.

Another prominent firm of stud sheep-breeders lives higher up the Winterberg, viz., Messrs. C. Adams and Son, of Glen Roy and Springfield. I could not manage to get as far as Springfield on this trip, but have been supplied with an excellent photograph of a valuable importation which has recently been added to their stud, in the shape of "Goldfinder III." This sheep was secured at the sale of Mr. H. Gibson's stud, at Fairfield, Tasmania, in March last, together with several others, by Mr. C. Adams, and arrived in South Africa a few months ago. The following are the pedigrees of the whole of the new importations, all bred by Mr. H. Gibson, of Fairfield, Tasmania:—

Two Rams:

No. 2.—"Goldfinder III.," sire, "Goldfinder," by "Survivor," by "Primus," by "President," by "Golden Horn II.," by "Golden Horn," by "Treasurer," by "Golden Tom," by "Sir Thomas II.," by "Sir Thomas"; dam, Fairfield 1st stud ewe.

No. 2.—Sires, "Dense Magician," by "Magician," by "Hercules," by "Royal Hero"; dam, Fairfield 1st stud ewe. No. 29 on horn.

Two ewes bought in pen No. 75 at sale, Fairfield:

1 ewe, tin tag in ear A53 (champion ewe at Mid. Ag. Society's Show, Campbell Town, Tasmania). Sire, "William," by "Buffalo Bill," by "Vice-President," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag in ear A 54 (champion ewe at A.S.B. Assoc. Show, Melbourne, and dam of "Goldfinder II."). Sires, "William," by "Buffalo Bill," by "Vice-President," by "President," etc.; dam, Fairfield 1st stud ewe.

Three ewes, bought in pen 70 at Fairfield sale:

1 ewe, tin tag in ear A93. Sires, "Tomborn," by "Harmony," by "Survivor," by "Primus," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag in ear E9440. Sires, "Tomborn," by "Harmony," by "Survivor," by "Primus," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag in ear A78. Sires, "Jubilee II.," by champion ram "Jubilee," by "President," etc.; dam, Fairfield 1st stud ewe.

Five ewes, bought in pen 77 at Fairfield sale:

1 ewe, tin tag A51. Sires, "Senator," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag A57. Sires, "Survivor," by "Primus," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag 861. Sires, "Radical," by "Primus," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag EG439. Sires, "William," by "Buffalo Bill," by "Vice-President," by "President," etc.; dam, Fairfield 1st stud ewe.

1 ewe, tin tag EG438. Sires, "Son of Senator," by "Senator," by "President," etc.; dam, Fairfield 1st stud ewe.

Five ewes, bought from Ernest Gibson, branded No. 18 on near ribs in white paint:

2 ewes, by "Survivor," by "Primus," by "President," etc.

1 ewe, by "Sunlight," by "Primus," by "President," etc.

1 ewe, by "Young Survivor," by "Survivor," etc.

1 ewe, by Reserved stud ram.

THE VINE MILDEW—"PLASMOPARA VITICOLA."

By R. Dewar, B.S.A., F.E.S., Eastern Province Entomologist.

What is a fungus? This is a very difficult question to answer to the satisfaction of one unfamiliar with botanical science, and it is highly improbable that even a specialist would attempt to clearly and concisely define a "fungus" in one short sentence. However, it is a question that has been on the minds of many people during the last few months, especially with reference to the newly proclaimed vine disease, and consequently will bear a brief attempt at description.

The Fungi compose one of the lowest divisions of the plant kingdom, and together with Bacteria constitute a large and vastly important group of plants characterised by the lack of chlorophyll (green-colouring matter) which is found in all higher plants. The mushroom and toadstool, by their general white appearance, exhibit this lack most familiarly to the average observer. It is the presence of their chlorophyll that enables all our well-known plants to prepare their necessary food from the raw food materials of the air and soil, and without it a plant must be dependent on other living or dead chlorophyllus plants. Thus it is that fungi are always parasitic or saprophytic; the former subsisting on other living plants, and the latter existing amongst decaying vegetable matter. A few fungi, such as the mushrooms, are conspicuous individually, but most are very minute in size, require a microscope to study even their largest parts, and only attract our attention when under favourable conditions they overrun a country like an epidemic. Similarly to the locusts they are insignificant individually, but of mighty import collectively. They further differ from higher orders of plants in not having vessels for carrying the food or food materials, and in reproducing by *sporès* instead of by seeds.

Any small fungus plant consists of two parts—the vegetative or nutritive and the reproductive. The former absorbs the food from the host and makes the necessary growth, whilst the latter is responsible for producing new plants. The vegetative part usually consists of a number of interwoven threads or *hyphæ* which are in contact with the food supply and from these arise the reproductive stalks or *conidiaphores* which bear the *spores* somewhat after the manner the wheat plant forms its dense spike of bloom and seed. The spores under suitable conditions germinate and form another and separate mycelium which again in turn produces a harvest of spores to infect hundreds of other hosts, and rob them of their vitality.

We have to do mainly with parasitic fungi. These are divided into two categories depending on whether the mycelium is on the surface of the host plant and exposed, or whether it penetrates and develops in the plant tissues and is protected. The former are said to be *epiphytic* (Example—*Oidium Tuckerii* of the Grape) and the latter *endophytic* (Example—Plasmopara viticola of the Grape). It will be obvious then that such different methods or places of growth are important to notice, as they radically in-

fluence the methods of treatment. The epiphytic fungi acquire their nutriment by means of special outgrowths or branches from the mycelium which penetrate the cell walls and absorb the cell sap, *but the main growing part is always on the surface.* In the case of endophytic fungi, *the mycelium or growing part itself penetrates and ramifies in the intercellular spaces,* directly absorbing the nutriment. The former may be said to be naturally exposed, the latter naturally protected.

As previously mentioned, the reproductive bodies analogous to seeds of higher plants are termed *spores.* These are always very minute, vary considerably in shape, depending on species, and are usually formed in large numbers. There are, generally speaking, two kinds of spores—the *summer spores,* produced during summer, with thin walls, and capable of germinating, under suitable conditions, in a few days or even a few hours, and the *winter spores* (or more properly *resting spores*), produced in the colder season, thick-walled to resist unfavourable conditions, and usually requiring a period of rest before germination. A few other special forms are noticed in the life-history of different fungi, but it will suffice to mention the above two

Moist weather and heat are conducive to fungus growth, given the presence of a specific organism. And this latter factor should be particularly noted, because, no matter how rainy and sultry the weather, we can have no fungus disease unless the specific pathogenic organism, whether spore or mycelium, is present Many people hold the erroneous opinion that the previous rainy season in the Eastern Province was the cause of the Vine Mildew. *The presence of spores of Plasmopara viticola was the cause; the rainy season presented ideal conditions for its rapid development.*

For infection of a plant by a parasite some means of entrance to the host is necessary. This the fungus gains through wounds in the plant-tissue made by various agencies, such as hail and insects, through the natural breathing-pores of stomata of the leaves, and sometimes through the dissolving action of certain enzymes which it secretes.

The injurious effect of parasitic fungi on their host plant has a very wide range; from the destruction of single cells, as exemplified in the lower fungi, to the killing of organs as the Plasmopara destroys the leaves of vines, and further to the slow or rapid destruction of whole plants as caused by root and some wound parasites No parts of a plant may escape; roots, trunk, branches, leaves and fruit are variously attacked. It is only by an intelligent and energetic use of preventive means and remedies that the fruitgrower and agriculturist can cope with their ravages

Story of the Vine Mildew.

The Vine Mildew is known scientifically as *Plasmopara viticola,* and is placed in a group of fungi, the Peronosporaceæ, which also includes the notorious potato disease, *Phytophthora infestans,* that has played so much havoc in the potato fields of Europe, and especially Ireland. I mention this close connection because both these diseases are markedly associates of moist weather, a factor which plays an important role when considering the economy of the Vine Mildew.

The *Plasmopara* of the vine is a fungus of American origin. It was described under the name of *Permospora viticola* in 1863 by De Bary, from American specimens. Prillieux states that it was first noticed in France in 1878 on some leaves of the American vine (le Jacquez), but after a careful search, was found to have spread over a considerable territory. In 1881 it had reached Algeria, and, according to Prillieux, "it spread itself from the springtime with such an intensity that the viticulturists feared a time when the new plague from America would render impossible the culture of the vine in that country." Apparently the dry climate has

saved them, as I am told it has also done in the south of Spain. Conversely the vineyards of Germany are seriously affected, owing to the moister climate of the Rhineland.

The history of the disease in South Africa is more recent, and the consternation it has caused is still fresh in our minds. Dr. Schönland, Professor of Botany at Rhodes University College, has made known that Engler-Prantl, in their *Naturlische Planzenfamilien*, 1897, recorded the presence of *Plasmopara viticola* in "South Africa (Cape Colony)." No further information is given, and one is inclined to feel that at the very least such a record is extremely indefinite and subject to some doubt.

It was on January 18th, 1907, that Mr. Tidmarsh, Curator of the Botanic Gardens in Grahamstown, drew my (the writer's) attention to the diseased condition of a few vines in the Gardens, and as I had been sending various specimens of plant diseases to Mr. Pole-Evans, Plant Pathologist in the Transvaal Department of Agriculture, I likewise sent a few of these diseased vine leaves to him without attempting to identify the fungus myself. Mr. Pole-Evans at once advised Mr. Lounsbury, Government Entomologist, that he had identified the fungus as the notorious American Vine Mildew, *Plasmopara viticola*, and pointed out its serious nature. Further search was then made, when it was found that the mildew was very general throughout Grahamstown. Early in February all vines in the Grahamstown Nurseries were quarantined until further investigation could be made into the prevalence of the mildew in the Colony. Uitenhage, Graaff-Reinet, Cradock, Queenstown, King William's Town, and some parts in the Western Province were searched, without finding a trace of the mildew. We were then beginning to think that it might be isolated in Grahamstown, and radical measures might stamp it out, when late in March it was found in the Fort Beaufort and Stockenstroom Districts, and another search revealed it in various other centres, including Graaff-Reinet, Uitenhage, and King William's Town, until it was finally shown to be generally present in the Midlands and Eastern Province. Drastic legislation was then promulgated to try to prevent an invasion of the great viticultural districts of the Western Province; the Transvaal made similar active prohibitions, and the whole agricultural and horticultural trade of the East was stopped. Strong representations were made from the East, pointing out that there was evidence to show that the mildew had probably been in the Eastern Province for a number of years, that the climatic conditions of the West were unfavourable to its growth, and thus made the Western viticulturists theoretically safe: and, if not, then no measures, however drastic, could now stop its spread into the West. Late in the season, owing to these representations, the restrictions in Cape Colony were removed except on Vitaceæ, but the Transvaal still prohibit all nursery stock, and, under certain conditions, vegetables and fruit, from infected districts.

The present position, under the *Plasmopara viticola* Regulations, of this and the neighbouring Colonies is as follows:—The *Transvaal* prohibits all nursery stock, vines and products of the vine of any description. Farm produce is accepted if accompanied by a Magistrate's or a J.P.'s certificate to the effect that such produce was grown beyond a radius of a quarter of a mile from any Vitaceæ. These restrictions will be relaxed when the Transvaal is satisfied that spraying of vines with the blue vitriol and lime solution prescribed has been effective. That Government is also being urged to admit wine, brandy, vinegar and raisins from the infected area. The *Orange River Colony* excludes only vines or portions, or fruit thereof. *Rhodesia* excludes all plants, fruits and vegetables whether from nurserymen or others. At the request of this Government the Administration of Rhodesia are considering a modification of their regulations, and it is understood that these will be relaxed. As regards *this Colony* (1) vines or

portions or fruit thereof cannot be sent from the infected to the clean area; (2) packing material for nursery produce (including trees, plants and vegetables) must be dipped in, or sprayed with, the solution mentioned, prior to packing. The same applies to packing material of fruit sent by others than nurserymen.

Effect of the Mildew.

The *Plasmopara viticola* is essentially a fungus disease of the vine, but it also attacks, in a less degree, the Virginia Creeper, and in America is said to occur on the wild varieties of grapes. Thus far I do not know of it being found on our wild vines, although Dr. Schönland and myself have examined a number of them in the neighbourhood of Grahamstown, and in proximity to infected cultivated vines.

The *Plasmopara* is especially noticeable on the leaves, but it also attacks the fruit and young branches. Looking at the diseased vines from a distance one notices their brown dead leaves and their partly defoliated appearance, whilst upon closer examination the green leaves are seen to be covered with brown patches and with the edges more or less dried up, which increases rapidly until they become dry and crisp, and eventually fall to the ground. The spots where the leaves are principally attacked are at first small, and on the upper surface appear yellow, changing soon to a reddish brown, but it is on the under side, especially along the veins, that the distinctive appearance is seen—a sort of white efflorescence appearing, very much like a deposit of frost or a downy patch of mould This is made up of large numbers of *conidiaphores* of Plasmopara, the mycelium of which creeps amongst the cells of the leaf, absorbing the cell sap, and causing the browning and drying of the leaf, as explained above.

When the fruit is attacked early the berries rarely attain more than one-fourth their full size, which may be due directly to the attack of the fungus, and indirectly to the defoliation of the vine. The berries turn brown or grey in colour if the fungus fruits upon them as on the under side of the leaves

The young shoots may also be badly attacked, especially if conditions are favourable, as they were last season in the Eastern Province. The downy patches of mildew do not appear as on the leaves, but the mycelium spreading in the tissues causes the shoots to shrivel up, turn dark-coloured, and eventually die. There are no distinct black depressions as seen in Anthracnose

Description of the Fungus.

At the present time the Mildew is in its winter or resting stage Thick-coated spores, technically known as *oospores*, are probably lying all around vines that were infected last summer, protected by the soil, old dead bark on the trunk of the vine, or, more likely, in the tissues of last season's dead leaves and dried fruit, where the oospores were first formed from the mycelium. When spring advances, and favourable conditions of moisture and heat prevail, these oospores which are lucky enough to be carried by the wind or other agencies and deposited on all young growing parts of the vine, burst their thick winter coat and send forth a germinating tube, which becomes the future mycelium. This mycelium ramifies amongst the plant cells and soon sends up fruit-branches (conidiaphores), through the stomata of the leaf, which bears the summer spores. The upper part of these conidiaphores are characteristically branched, and the spores are borne on little points at the tips of the branches.

We now come to an important point in the life-history of the Vine Mildew, In a very short time, if drops of water are present, summer spores evolve

themselves within from six to eight smaller and very peculiar spores, each of which have two small whip-like lashes (cilia) attached to one end. These new spores are termed *zoospores*, meaning animal spores, because by means of the cilia which wriggle from side to side they are capable of movement in water, which in this case would be supplied as rain drops on leaves. Without water the zoospores could not move, and must very soon perish. In fact *moisture* is important all through. Without it the oospore would not germinate, and might remain quiescent for an indefinite period; without it the conidiaphores would find difficulty in developing, and without it the zoospores would not be formed. The necessity of the actual presence of water in visible form was shown by several cases which were brought to my notice last summer in Grahamstown. In one of these, a vine growing in an exposed position had sent several strong growing branches through an opening into a closed shed. The vine outside was severely attacked by the mildew, but the branches inside were quite healthy, and the leaves showed no outward signs of infection.

Well, supposing that suitable conditions with regard to moisture are with us, then in about an hour the zoospores will germinate, and in turn produce another vegetative part or mycelium. More conidiaspores are formed, more zoospores, more mycelium, and so on through the summer as long as favourable conditions prevail. But given a few hot, dry days, and the fungus is immediately checked, and becomes busy forming oospores to tide over unsuitable conditions. It is a marvellous story of adaptation, and shows how even these very low forms of plant life have evolved various stages to withstand or take advantage of Nature's various moods.

Preventive Measures and Remedies.

Is man able to put conditions in their way which they are unable to meet? Fortunately, *Yes*. In America, the home of the mildew, it is looked upon as "a disease which can be largely or entirely prevented at comparatively slight expense, although at one time it ruined nearly the entire crop of certain Eastern districts, and threatened to destroy the vineyard industry over a large area. This salvation was obtained by the knowledge gained from French experiments that the fungus could be destroyed in certain stages by spraying the vines with dilute solutions of certain salts of copper, particularly Sulphate of Copper, more commonly known as "bluestone." The disease was found to be much worse in low-lying and damp parts of the vineyards than in the drier and higher parts.

In France, Prillieux states: "When we had to resort to numerous importation of American vines, in order to replace French vines destroyed by the Phylloxera, we already knew what damage Peronospora viticola caused in America; we were able to predict the danger of introduction of this dangerous parasite of American vines, *but not to prevent it.*" The spread of the mildew in France soon threatened French vineyards with destruction, as the Phylloxera had done some little time before, and it was a singular and fortunate incident that showed the efficacy of Copper Sulphate in controlling the new disease. Nothing more or less than the habit of some vineyardists along public highways to sprinkle a mixture of milk, of lime, and some salt of copper (Copper Sulphate being mostly used on account of its cheapness), to prevent the children from stealing the grapes, owing to the bluish mixture appearing poisonous. It was soon noticed that vines so treated retained their foliage, whilst others, near by but untreated, lost their leaves owing to the attack of mildew. It did not take long to ascribe this beneficial action to its proper cause—the mixture of copper and lime—and Prillieux was one of the first to experiment with this mixture and make known its efficacy. Since that time in France it has proved a marked success.

In Germany the results have been the same, although on account of the moister climate, especially along the rivers, it has been found necessary to use more diligence and probably a greater number of sprayings in controlling the disease.

In South Africa, thus far, no experiments have been conducted, and we must, for the time being, base our recommendations on European experience, selecting, as far as possible, that experience obtained in countries or districts with climatic conditions similar to our own. The Government at present have Dr. Perold touring the country and demonstrating to those interested the methods of preparation and the manner of spraying of the cupric solution, known as Bordeaux mixture, which has been so successful in controlling the disease in those other countries mentioned above. I cannot do better in conclusion than to give briefly his recommendations, which are based on European experience and advice. The following materials and proportions should be used:—

Bluestone	2 lbs.
Slaked lime (best)	2 lbs.
Water	10 gallons.

The mixture should be made in clean wooden tubs or barrels. Into one barrel put 5 gallons water, and in the upper part of this suspend 2 lbs. of bluestone in muslin, and allow it to stand until dissolved. Into another barrel place 2 lbs. of good slaked lime in 5 gallons of water. The lime and water should be thoroughly stirred, the whole being then poured into the solution of bluestone and water and well mixed, when it is ready for use. The mixture should be made as required, that is to say, from day to day, as by being kept it loses effectiveness. With reference to the time of spraying, it will be evident, when one notices how much the disease depends on climatic conditions, that it is impossible to set exact dates for spraying, and that one must work from approximate dates.

For this reason Dr. Perold advises one to spray for the first time some three weeks before the vine flowers, which practically means that it is best done when the shoots have a length of from one to one and a half feet. The second spraying can be done about one month later, when the berries will have set properly. Any need for further spraying will depend on the weather If dry and hot there will be no need for further spraying; if moist and warm, a third spraying may be made about three weeks after the second, and further sprayings at intervals of three or four weeks. The vines should not be sprayed within twenty days of the time when the fruit is to be picked.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during July, 1907.

Port of Shipment.	Description.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	England	50	Naartjes ...	750	3 15 0
" ...	"	54	Oranges ...	1,570	3 1 0
" ...	"	6	Shadocks ...	90	0 9 0
" ...	German South West Africa.	6	Pears ...	900	3 1 6
" ...	"	12	Bananas ...	9,900	14 17 0
" ...	"	81	Oranges ...	15,320	40 16 6
" ...	"	138	Apples ...	17,165	59 9 9
" ..	"	10	Lemons ...	2,200	5 8 0
" ..	"	21	Naartjes ...	4,350	12 14 0
" ...	"	5	Pineapples ...	472	2 19 0
" ...	Mauritius	100	Apples ...	5,000	40 0 0
" ...	"	20	Pears ...	800	6 0 0
" ...	Portuguese East Africa.	30	" ...	1,500	8 0 0
" ...	"	15	Apples ...	750	6 0 0
" ...	"	16	Oranges ...	640	3 4 0
" ...	Germany	2	" ...	500	1 0 0
" ...	Portuguese West Africa.	210	Pears ...	5,400	45 0 0
" ...	"	215	Apples ...	9,200	107 10 0
Port Elizabeth	England	14	Oranges ...	...	4 0 0
"	"	12	Pines ...	728	2 2 0

EXPERIMENTAL CROPS IN CAPE COLONY.

GRASSES.—A SECOND REPORT.

By ERIC A. NOBBS, Ph.D., B.Sc., Agricultural Assistant.

In August, 1906, was published a collection of reports by farmers from all parts of the Colony who had been co-operating with the Department of Agriculture in the growing of grasses in experimental plots. On the whole the tone of these reports was encouraging, and further trial has now confirmed in most instances the impressions already created as to the suitability and feeding value of a number of foreign grasses.

Most of the accompanying reports are from different sources to those previously published, and it is becoming evident that certain grasses have come to stay, and that the only difficulties to be overcome are those of informing the public of the results attained and of inducing importers to stock the seed, for which in the first instance there must necessarily be a somewhat coy and hesitating demand. In a case of this sort the most convincing evidence is that of the men who themselves tried the grasses, and these are therefore published *in extenso*, except in the case of paspalum, regarding which the reports are too numerous to reproduce, and in a number of cases rendered of no value through the seed not having been sown in the peculiar manner which is necessary for this special grass, and directions for which were specially furnished.

Several grasses tried have failed to give general satisfaction, only succeeding exceptionally, and these are dropped. On the other hand, a number of grasses are being tried initially on a small scale and, if found sufficiently promising, will be distributed later on for more widespread trial. Amongst these are several indigenous species which appear to merit attention.

PASPALUM DILATATUM.

No grass has risen so rapidly into popularity and hardly any is now better known than paspalum—its generic name has become more popular than the Australian "golden crown grass" or American "large water grass"—and certainly it deserves its reputation. In the space of about four years its value has come to be widely recognised, and it promises to become one of our standard crops. In this respect it seems likely to be the pioneer of a number of grasses, and serve to popularise in this country the principle of artificial pastures: that is, temporary camps or paddocks, ploughed or sown, as distinct from the natural pasture of the unbroken veld. The chief value of paspalum will be a fodder crop for grazing or for hay in regions where from one cause or another lucerne ceases to flourish. Paspalum, while thriving wonderfully in unfavourable condi-

tions responds best in a fertile soil, particularly in hot and damp situations. It withstands frost in so far as it is not killed by moderate cold, and though it withers down completely yet it shoots up again when the warm season returns. On the whole it seems best suited for our coastal regions both east and west, and cannot rival lucerne on irrigated Karroo soils, nor does it do so well in our colder parts.

No fewer than one hundred and thirty reports have been received, and being so numerous only a selection can here be published, but the following analysis of the returns is interesting. Eighty-four reports are decidedly favourable, nineteen indefinite. Twenty-eight failures are recorded, and these are in the majority of cases attributable to non-germination owing to unfavourable climatic conditions or negligence in treatment. A number of reports received are by no means clear as to the treatment given, but where distinction can be made the following particulars are instructive.

Where irrigation was practised we have twenty-four successes against four failures, whereas under rainfall are recorded forty-nine successes and fifteen failures. In twenty-three cases the seed never came up. Farmers are always recommended to sow this seed in beds and plant out. In twenty-two instances direct sowing was, however, tried, but ten of these attempts proved failures, confirming the experience of Australia that transplanting is after all the best means of establishing this grass. These figures and the appended reports speak for themselves. The seed of this grass is now stocked by a number of merchants at the ports and up-country, while some enterprising farmers sell roots ready for planting out. The success which this grass has now achieved merits its trial by all who have not yet had experience with it

The following are the reports: —

Paarl (Mr. G. J. Hugo).—Sown January, 1907. Result: Good. Very suitable to district. I consider paspalum one of the best kinds of grasses ever imported in this district. If irrigated it will overgrow any other grass here. It is a soft grass but sour, with very rough and tough roots.

Wellington (Mr. J. J. van der Merwe).—Sown: No date given. Result: Good. Sown in early winter, but germinated only at the beginning of summer. Still in seed bed, doing splendidly. Will commence planting out in rainy season. Tried several slips got from Paarl Farmers' Association on different classes of soil with varying results. Think they will do better if planted and and settled before dry season overtakes them.

Stellenbosch (Mr. G. N. Lindup). Sown 12th April, 1906. Result: Good. Sown broadcast on irrigated land, weeded frequently, and let water often soak round beds. Applied farm manure and guano. Weather dry and windy. Consider crop very useful in this district and will pay as it grows fast and strongly. Found plants had thriven well, and planted the tufts down in moist parts of paddock vlei ground which had been ploughed, but was stiffer clay, and a number of these tufts died off though the ground remained wet all through so far but having saved a lot of the seed, hope to get a strong patch next season.

Caledon (Dr. Viljoen, Elgin).—Sown September, 1906. Result: Good. I am so impressed with the suitability of paspalum for my part of the district that I am putting 100 acres under it, and hope rapidly to extend the area in future. It can be sown broadcast or planted with roots. If the former thoroughly pulverise the ground; fertilise if necessary. Very good results from this treatment. Very suitable for district, and will pay.

Caledon (R. Metcalfe).—Sown October. Result: Good. Very suitable in moist vleis. Makes splendid fodder. I planted about an acre of roots in a damp vlei and they have all taken and are doing well. My idea is to let the seed shed.

Bredasdorp (Messrs. A. Ohlsson & Co.) (Mr. C. Marais).—Sown 8th January, 1907. Result: Good. I saw paspalum grass grown in this district sown last year, and judging from the growth it will be most suitable for our dry Karoo. I would recommend this grass; it took about three weeks to germinate, but grows rapidly. I think it will pay to sow broadcast in veld.

Riversdale (Mr. J. W. Smalberger).—Sown September. Result: Good. I look upon this as one of the best grasses that a farmer can grow in this district. It will take the place of lucerne, which only answers well on a few farms. Horses eat it greedily. I intend cultivating this grass on a large scale.

Riversdale (Mr. Thos. J. Skeen).—Sown October, 1906. Result: Good. I consider it suitable, and will pay in this district. Sown broadcast on unirrigated land. Can stand a lot of drought, but seed must have water to grow to get a footing. Unable to estimate the yield. Reaped in March.

Riversdale (Mr. F. de Jager).—Sown 12th September, 1906. Result: Good. In my opinion this grass will do well on unirrigated ground in this part, and of course better on irrigated land. The grass was sown on 12th September, 1906, and transplanted 8th January, 1907, 18 inches apart both ways. Reaped early in April, and after transplanting no rain fell until the end of March, still the sheaves were up to 2½ feet in length. It is considered exceedingly suitable to this district.

Tulbagh (Mr E. G. van der Merwe).—Sown 15th January, 1906. Result: Good. Will certainly pay I intend sowing it largely in future. Not reaped.

Ceres (Mr. L. Boyes).—Sown, 4th August, 1906. Result: Good. August, I think, is the right time to sow the seed; it all germinated. I obtained roots from Mr. Buller, which were planted in August, and are now in full seed, and in a year or more I should think would be very advantageous as fodder for milch cows. I should recommend planting the roots in August. If frost does not affect it, it will be a splendid grass for farmers, but it requires care Suitable for district if watered during summer.

Komgha (Mr. Walter A. Edmonds) —Sown 5th November, 1906. Result: Good. Sown broadcast on unirrigated land. Well watered and weeded Thrives better than lucerne, and should pay in these parts. Stands 18 to 24 inches high, and will be planted out when opportunity occurs.

Lower Albany (Mr. J. J. Long, Salem).—Sown November. Result: Good. Sown broadcast thinly on unirrigated land, rather late for district. Weather very wet at first and then very dry. No disease; grass healthy in every respect. I consider it suitable for district, and will pay Makes excellent feeding for ostriches; whole crop was eaten off by them

Upper Albany (Mr. Frank S Tuberville, Highlands).—Sown 21st September. Result: Good. Sown in seed-beds. Came up splendidly, and when planted out all grew well, and are now growing fairly rapidly. About 2 feet high, and beginning to seed.

Graaff-Reinet (Mr. J. Brodie).- Sown 13th December, 1906, 14th November, 1906. Result: Good. Seed has germinated splendidly, and is growing rapidly. I consider this grass most suitable for district

Cathcart (Mr H. de Wilton Smith).- Sown 1st November, 1906. Result: Good. Sown broadcast and thickly on unirrigated land. Suitable, and will pay in this district. Germinated well, and took good root. Attacked by locusts three times in February.

Tarkastad (Mr. F. E Leppan).- Sown: No date given Result: Fair. Paspalum exists through the winter here, but the old leaf becomes yellow and almost dry. As it is its first winter, I am in hopes that it will stand better, when more thoroughly rooted.

King William's Town (Mr. W H Manley).--Sown 20th October 1906. Result: good. I consider this a very suitable crop for the district and good for winter grazing for sheep and cattle (this is the 21st June), and it is strong and healthy. I intend sowing 8 or 10 acres with paspalum during the spring

Griqualand East (Mr. J. H. Bennington). Sown September. Result: Good. Sown in drills and watered a little after sowing. Stands 20 inches high. Not yet reaped. I think it suitable for district and will pay.

Elliot (Mr. P. F. Osborne)--Sown 24th October, 1906. Result: Good. I consider this a good crop if it can be irrigated, the grass grew well, but frost in May seems to have withered it up a good deal.

Elliot (Mr. S. L. Thompson). Sown January, 1906 Result: Good. I think this grass will grow well in this district. The seed should not be harrowed in except with a very light harrow. Rolling in would be better. The seed takes a long time to germinate, grows rapidly, spreads well, and stands the frost fairly well.

ITALIAN RYE GRASS.

The success of Italian Rye Grass is really phenomenal, especially when it is remembered that this is a thin-leafed grass yielding hay or grazing of the finest quality. It must, however, be remembered that while yielding two cuttings or one good cutting and subsequent grazing, yet it is an annual and will only last the one season. The notes of experiments with this

grass are very instructive and deserve the closest attention. The seed of this grass is cheap and plentiful, in this respect different from certain others which are hard to obtain. Previously (August, 1906), nineteen results were published, of which fourteen were successful, two failures, and three indefinite. To these we can now add thirty-two, giving a total of fifty-one reports, amongst which thirty-four are successful, eight condemn it, while nine are negative. Dr. Viljoen, whose statement heads this list, has, since reporting, sown the seed referred to, which is promising very well, and, if successful, will revolutionise in some respects the accepted agricultural notions of that neighbourhood. Successful as this grass is, it must not be forgotten that the seasons have been favourable. It will not stand dry weather and cannot be recommended for our more arid regions at all.

Caledon (Dr. Viljoen, Elgin).—Sown 1st September, 1906. Result: Excellent. Eminently suitable for district, and will certainly pay. I am so satisfied with this grass for cows, sheep and pigs that I am putting about 60 acres under cultivation next winter. Should be sown with first rains (April) and the ground well fertilised. It is, in my opinion, the best winter feeding we can sow.

Caledon (Mr. J. S. le Sueur).—Sown 29th August, 1906. Result: Good. Suitable, and will pay in this district. Seed germinated very well considering the very dry weather experienced between date of sowing and 12th October, when the first rain fell. The growth was fair but not high enough to cut. I am sure it will answer well if sown in July with fair rainfall. Animals eat it readily. Towards summer it died off, but recovered with rains in middle of December.

Caledon (G. Aspinall, Bot River).—Sown November, 1906. Result: Fair. Quite healthy. Not reaped but eaten off. Wants plenty of fertilisers and water. Would pay if worked in good soil.

Bredasdorp (Mr. J. D. Albertyn).—Sown 5th June, 1906. Result: Poor. This grass has been sown on the farm for years, and is a very good grass for vlei lands. It only thrives with irrigation. The seed you sent me did not come up well. Not reaped.

Tweefontein (Mr. N. Heatlie).—Sown 7th September, 1906. Result: Fair. Answers fairly well on sandy soil. Advise anyone sowing this grass to see that the soil is thoroughly cleansed of all weeds, especially cutch.

Worcester (Mr. J. D. Hugo).—Sown 15th July, 1905. Result: Failure, attributed to late sowing of seed.

Wellington (Mr. L. Abrahamson, M.L.A.).—Sown September. Result: Good. Sown a little late on irrigated land broadcast. Weather warm. Very suitable for vlei lands which can be irrigated. Specially suitable for rearing good stock on.

Wellington (Mr. J. du Biel) —Sown 15th August, 1906. No crop. Died of drought.

Wellington (Mr. Wm. McMillan, P.O Malan Siding).—Sown 8th May, 1906. Result: Indifferent. Sown broadcast on unirrigated land, slightly harrowed, weather very dry. I consider it doubtful if crop is suitable for district, and do not consider it would pay at present. It is the only grass sown that is going to seed. I see the drought is very hard on it, but the root is still there and freshening up again after a shower of rain.

Paarl (Mr. A. H. Schmidt).—Sown: No date given. This grass did not germinate at all.

Cape Flats (District Forest Officer, Epping).—Sown 22nd June, 1906. Result: Indifferent. Sown thinly on unirrigated land broadcast, harrowed, weather dry. Germination good. Crop weathered under summer heat. The land selected under the conditions proved unsuitable. Bird depredation in early stages very severe. Crop a failure owing to lack of rain.

Cape Flats (Mr. J. Courtnay, Elsie's River Halt).—Sown, July, 1906. Result. Fair. Suitable, but I think Perennial Rye Grass variety better. Came up well and reached about 2 feet high. Allowed to ripen and seed itself.

Toise River (Mr. W. Cawthorn).—Sown 9th October, 1906. Result: Good. Very suitable. A fast grower, and makes excellent pasture for sheep. I intend cultivating it largely for hay. Six inches high on 26th March last. Not reaped yet.

Toise River (Mr. W. F. Bennet).—Sown about October. Result: Good. Requires deep soil free from clay. Sandy white soil is the best. This grass stools very well if sown in damp ground. Would not require any watering. Grows well in poor ground. Suitable if rains are plentiful, and will pay.

Bedford (Mr. A. G. King).- Sown: No date given. Result: Excellent. Sown on irrigated and unirrigated lands. Have had this grass for five years. It is a splendid variety, and if allowed to seed the young grass comes up in the autumn and stays green the whole winter, giving a good feed for stock.

Bedford (Mr. W J. Mapham).--Sown 29th October, 1906. Result: Fair. Sown thickly and broadcast on unirrigated land Not harvested. Suitable in parts of district, and should pay.

Cathcart (Mr. H. de Wilton Smith). -Sown 1st November, 1906. Result: Bad. Sown broadcast and thickly on unirrigated land. Attacked by locusts in February. This rye grass is not good for agricultural farmers as it appears to hybridize and become what is known here as "Draaibok." (A readily comprehensible misappre hension. Fortunately not the case --E. A. N.)

Tarkastad (Mr. F. E. Leppan).—Sown: No date given. Result: Fair. This grass has taken root well so far. Cannot say if it will stand the severe frosts.

Dordrecht (Mr. E. V. Birch).—Sown 5th November, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Germinated well and soon made a fine show. Regret that it was eaten off by locusts before the winter, as I think it will only stand the cold. It is a splendid feeding grass.

Colesberg (Mr. G. Meiring).—Sown 27th August, 1906. Result: Indifferent. Sown too thickly, consequently when about 1 foot high pressed each other. Not reaped. Cannot offer a fair opinion on this trial.

De Aar (Mr. C. G. Marais).—Sown October, 1906. Seed did not germinate

Beaufort West (Mr. R. Dixie) Sown 26th November, 1906. Result: Fair Sown broadcast and thickly on unirrigated land Mostly washed away by storm shortly after sowing Is suitable for district, and will pay, but not so good as paspalum

Knysna (Mr. E. Bibbey) - Sown 15th August, 1906. Result: Fair. Grass came up well, but weeds seemed to destroy it. I do not consider it suitable for district.

Knysna (Mr. J. J Hooper) Sown April, May, July. Result · Bad. Came up well, and grew to about 6 inches high when it was attacked by rust and killed. I do not think it suitable for this part

East Griqualand (Mr. R N Forrester) —Sown February, 1906 Result . Good Is both suitable and will pay in this part

East Griqualand (Mr W. F. Raw) —Sown 5th December, 1905 Result . Good A very suitable and paying grass in this part, especially if we have a damp season Excellent for stock.

East Griqualand (Mr C. N. Lake). - Sown 3rd December, 1906. Result: Good Sown broadcast and thickly on unirrigated land I consider it a good grass suitable for this district. Partly destroyed by flood.

East Griqualand (Dr. G. R. Watson) —Sown 19th December, 1906 Result . Good. Sown broadcast and thickly on unirrigated land Incessant rains. Attacked by small fly in early stage of growth. Crop doing well

East Griqualand (Mr. W. E. Jelliman). Sown Date not given Result . Good. The grass came up well and grew nicely, but was unfortunately mostly washed away by severe thunderstorms.

Elliot (Mr H. S. Warner) Sown 1st October, 1906 Result . Poor Sown broadcast and fairly on irrigated land. Not suitable in this district as a hay crop as it is only 3 inches in height and we will be having frost in a day or two

Mount Frere (Mr. J. H. Bennington).—Sown 1st December, 1906. Sown on unirrigated land broadcast thinly. Not reaped. Weather very wet. Kraal and stable manure applied. Cannot state result at present.

Ugie (Mr. S. T. Lake). Sown 22nd December, 1906 Result: Good. Sown broadcast on unirrigated land. Suitable, and will pay Farmers should grow it for winter feeding for poor stock.

PERENNIAL RYE GRASS.

With few exceptions this grass has done well in the Transkei and south-east, the regions of plentiful summer rains, but has also generally failed in the West and South-West except in very wet parts. On the whole the impression left is not so favourable as in the case of Italian Rye grass, but on the other hand this grass usually does better in the second than in its first year, and in its native haunts is often sown with the Italian variety in order that a crop may be ensured by this latter in the

first season before the perennial rye grass is well established. Obviously this grass is only to be recommended when rainfall is abundant and where extreme dryness of the atmosphere and ground alike is exceptional.

The following reports have been received since August last year, when last notes on this grass were published: —

Ugie (Mr. C. N. Lake).—Sown 3rd December, 1906. Result: Good. Sown broadcast and fairly thickly on unirrigated land. A good grass for this district. Have twelve geese running on this patch of grass, and they prefer it to other varieties.

East Griqualand (Dr. G. R. Watson).—Sown 19th December, 1906. Result: Good. Sown broadcast and thickly on unirrigated land. Incessant rains. Attacked by small fly in the early stage of growth. Suitable for district. A very valuable crop.

Ugie (Mr. S. T. Lake).—Sown 22nd December. 1906 Result: Good. Sown broadcast on unirrigated land. Suitable and will pay in this district. Farmers should sow it for winter feeding.

East Griqualand (Mr. W. F. Raw).—Sown 5th December, 1905. Result: Fair. It does fairly well, and I think will pay, but not as well as Cocksfoot.

East Griqualand (Mr. D. B. Menne).—Sown 17th November, 1905. Result: Fair. Both came up and grew well, but am not certain as yet if it will make a good crop.

East Griqualand (Mr. R N. Forrester). Sown February, 1906. Result: Good. Both suitable, and will pay in this part.

Elliot (Mr. H. S. Warner).—Sown 1st October, 1906. Result: Indifferent. Sown broadcast and fairly thick on irrigated land. This grass came up well, but it has not come on as I expected. It is 3 to 4 inches in height and seems to hold its own against other grasses. Will let you know next season how it gets on.

Elliot (Mr. T. L. Thompson).—Sown January, 1906. Result: Good I consider this grass suitable to the district; it grows well on poor, marshy ground, spreads nicely, and has a strong deep root system.

Bolo (Mr. Paul Horn).—Sown 18th September, 1906 Result: Bad. Might answer if sown in early spring and under irrigation. Five weeks after the seed was up took rust.

Mount Frere (Mr. J. H. Bennington).—Sown December, 1906. Result: Bad. Very wet indeed. Do not know if seed worked out, very heavy storms. It is coming up very badly so far.

Somerset East (Mr. R. O. Hiscock).—Sown 30th October, 1906. Result: Fair. I do not consider that it will pay, as it is slow growing It might do well as winter feeding for sheep if sown on irrigated land.

Bedford (Mr. A. G. King).—Sown February, 1906. Result: Good. Sown broadcast and thickly on irrigated land. Suited to district, and will pay.

Bedford (Mr. W. J. Mapham).—Sown 29th October Result: Good. Sown broadcast and thickly on unirrigated land. Not yet harvested (25.3.07). Should be sown about March. Suitable and will pay, in some parts of the district.

Cathcart (Mr. H. de Wilton Smith).—Sown 1st November, 1906. Result: Indifferent. Sown broadcast and thickly on unirrigated land. If the grass is not allowed to seed it may be a good winter feed. Like the Italian Rye grass, it seems to be inclined to hybridize, and would therefore be dangerous for agricultural farms.

Dordrecht (Mr. E. V. Birch).—Sown November, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Germinated well, and soon made a fine show. Regret that it was eaten off by locusts before the winter as I think it will stand the cold. It is a splendid feeding grass.

Beaufort West (Mr. G. Pienaar).—Sown 1st April, 1906. Result: Excellent. Sown in drills on unirrigated soil. Left to look after itself. Reaped in October. Weather rather wet during the whole period. Was a splendid crop, and will certainly pay to cultivate it here. Horses like it, and even young ostriches may be reared on it. Grew very tall and quickly without any trouble. Very pleased at having such a good grass in my possession.

Beaufort West (Mr. R. Dixie).—Sown 26th November, 1906. Result: Fair. Sown broadcast and thickly on unirrigated land. Greatly damaged by storm shortly after sowing. Suitable for district, but not as good as Paspalum.

De Aar (Mr. C. G. Marais).—Sown October, 1906. Result: Failed to germinate.

Windsorton (Mr. J. G. Polly).—Sown May, June, July. Eaten by locusts.

Cape Flats (District Forest Officer, Epping).—Sown 22nd June, 1906. Result: Bad. Germinated well. Crop withered under summer heat; a failure owing to lack of rain. Land proved unsuitable. Bird depredation very severe in early stages.

Cape Flats (Mr. J. Courtenay, Elsie's River Halt).—Sown June. Result: Good. Suitable, and will pay, if the ground is properly cleaned My ground is very liable to twitch grass, so it is hardly a fair trial. It is the best grass for me, with the exception of the Awnless Brome. Came up very well and allowed to seed.

Durbanville (Mr. C. P. Smuts).—Sown 4th May, 1906. Seed failed to germinate.

Bredasdorp (Mr. J. D. Albertyn).—Sown 5th June. Result: Failed to germinate. Sown broadcast and thinly on irrigated and unirrigated lands.

Caledon (Mr. J. S. le Sueur) - Sown 29th August, 1906. Result: Good. I consider this grass suitable and will pay in this district. Seed germinated very well. Animals eat it readily Towards summer it died off, but it began to sprout again with the rainfall in middle of December. Considering the dry weather between the date of sowing and the 12th October, when the first rain fell, the growth was fair, but not high enough to cut If sown in July, with fair amount of rain, I am sure the result will be good.

Paarl (Mr. A. H. Schmidt).—Sown August, 1906. Seed did not germinate.

Stellenbosch (Mr. A. Nicholson)—Sown 7th May, 1906. Result: Bad. Will not stand the drought. Might do with irrigation.

Wellington (Mr. Wm. McMillan).—Sown 8th May, 1806. Result: Bad. Seed germinated, but the sun is too strong for it. Most of it is dead now.

Wellington (Mr. P. J. D Wessels).—Sown 29th May, 1906. Result: Indefinite. Sown broadcast on unirrigated land Not reaped yet I think if irrigated will do well. Seed sown still alive, but it remains to be seen whether it will last the hot summer

Wellington (Mr J. du Biel) -- Sown August, 1906. No crop; died of drought.

Wellington (Mr L. Abrahamson, M.L.A.).—Sown September. Result: Good Very suitable on vlei lands Good for rearing young stock on.

Porterville (Mr. R. G. Malan).—Sown early November, 1906. Result: Bad Sown broadcast on irrigated land and watered several times. Weather hot with a few showers of rain. Applied kraal manure rather thickly It might thrive if sown in the right season. Shall give it another trial. Seed came up all right, but was burnt up by the heat.

Worcester (Messrs. J. D. Hugo & Co.) Sown July, 1905 No crop probably because seed was sown so late in the season.

Ceres Road (Mr J C. van der Byl). -Sown May, 1906 Result: Indifferent. I don't consider this grass worth growing in this District It requires to be irrigated in summer, and cannot do without shade. It has never yielded a crop worth reaping.

Worcester (Mr. N. Heathe, Tweefontein). - Sown 7th September, 1906. Result. Fair. Answers fairly well on sandy soil. I advise anybody sowing rye grass to see that the soil is thoroughly cleaned of all weeds, especially cutch.

Knysna (Mr. J J. Hooper).- Sown April, July. Result: Bad Grew well, but was attacked by rust in September and completely destroyed.

Knysna (Mr. E. Bibbey) -Sown 15th August, 1906 Result: Bad. Attacked by rust and died before it was any size. Not suited for district.

Cocksfoot Grass

On this grass, within the year and including those already published, fifty-one reports have come to hand, of which twenty-six are favourable, seventeen for various reasons indeterminate, and eight bad. This must be regarded as very promising. Cocksfoot did well at Knysna where the rye grasses failed. From the Transkei comes very high praise and success in every instance (nine), except two, where no results are recorded. Cocksfoot does better than most grasses in the severe winters of the higher altitudes. Its success in parts of the Colony, subject to considerable dryness at certain times of the year, such as Beaufort West, Tulbagh, Caledon and Wellington is specially noteworthy and is unexpected. It requires protection in early youth from weeds and too close grazing. This grass is to be recorded as amongst the most promising, especially as these reports deal

with the first year, when it is well known that Cocksfoot only reaches its full strength in the second season.

East Griqualand (Dr. G. R. Watson).—Sown 19th December, 1906. Result: Good. Has made a thick veld three inches long. Have since sown 200 lbs., and expect good results. Weather extremely wet. Hail did considerable damage in January, and eaten off by small fly.

Ugie (Mr. S. T. Lake).—Sown 18th December, 1906. Result: Good. Sown broadcast and thickly on unirrigated land. A very good grass, and will pay to grow it in this district.

Maclear (Mr. Lawrence C. French).—Sown 24th December, 1906. Result: Excellent. Sown broadcast rather thickly on unirrigated land. I consider it a splendid grass for cultivation here and fully equal to any I have seen in the Mount Currie District.

East Griqualand (Mr. L. Conolly).—Sown February. No result.

East Griqualand (Mr. W. F. Raw).—Sown 15th December, 1906. Result: Very good. Hundreds of acres of this grass in district. It will be the making of same. Cattle, horses and sheep live on it during the winter. I generally sow my seed first putting in mealies, then when they are about a foot high I sow the grass seed, and this prevents the sun burning up the young plants.

Mount Frere (Mr. J. H. Bennington).—Sown 1st December, 1906. Will write a report later on as the heavy rains may have washed away the seeds.

Knysna (Mr. J. J. Hooper).—Sown April and July. Result: Excellent Grass seemed to thrive well. Excellent crops now maturing. I consider it suitable for district, and will pay, as so far it has answered well.

Knysna (Mr. E. Bibbey).—Sown 15th August, 1906. Result: Good. Sown thickly and broadcast on unirrigated soil. This seed has done better than other grass seeds, and, so far as I can judge, it has done well, and ought to be suitable for this district.

Knysna (Mr. G. A. Palmer, F.C.).—Sown 29th October, 1906. Result: Indefinite. This grass has not flowered. Must wait another year. Does not grow as well as native grass.

Mossel Bay (Mr. W. Howard).—Sown September, 1906. Result: Bad. Green barley or lucerne pay better on irrigated land. Not suitable for district.

Storms River (Mr. E. Schmidt).—Sown 5th November, 1906. Result: Indifferent. Sown broadcast on unirrigated land. Was much suppressed by Kruis grass, which grows abundantly. Too early to express definite opinion.

Bredasdorp (Mr. J. D. Albertyn).—Sown 1st June, 1906. Sown on irrigated land. Seed never came up.

Caledon (Mr. Henry Metcalf).—Sown April, 1906. Result: Good. Sown broadcast, thickly on unirrigated land. Harrowed and rolled. Grazed. Land manured for previous crop. Weather dry—late rains. Would make a good grazing for paddocks. I consider it suitable for district.

Belleville (Mr. C. P. Smuts).—Sown 4th May, 1906. Seed failed to germinate. Sown broadcast thinly on unirrigated land.

Belleville (Mr. C. W. Duminy).—Sown June, 1906. Failed to germinate.

Stellenbosch (Mr. A. Nicholson).—Sown 7th May, 1906. Result: Fair. Sown thickly on unirrigated land broadcast. Weather dry. Good stable manure applied. Have grazed the grass, and the cattle are very fond of it. Have not found it suitable, but think it might be on damp ground or under irrigation.

Wellington (Mr. W. McMillan, Malan Siding).—Sown 24th May, 1906. Result: Bad. The grasses all germinated, but died off soon owing to want of moisture and too much sun. No good for this district.

Wellington (Mr. P. J. D. Wessels, Zoutendal Siding).—Sown 10th June, 1906. Result: Good. Suitable for district, and will pay if irrigated. Sheep and other animals very fond of it.

Wellington (Mr. J. du Biel).—Sown 5th August, 1906. Result: Bad. Sown thinly in season broadcast. Died of drought in third month. Not suitable.

Hermon Station (Messrs. Bresler & Co.).—Sown 25th June, 1906. Result: Bad. Sown broadcast thickly on unirrigated land. Considered late for district. Weather wet in August, rest very dry. Applied 7 lbs. superphosphates. Ground was rather cold, and on this kind of soil it does not make much progress. It appears quite dead. I hardly think it would pay in this district, as it is only suitable under special treatment.

Tulbagh (Mr. G. J. Euvrard).—Sown 29th June, 1906. Result: Good. Sown thickly on unirrigated land broadcast, rather late for district. Top dressing Government Guano. Fed down by cattle and sheep. Healthy growth. Weather very dry for Tulbagh. Will pay to sow paddocks with it for feeding down. Resist dry summers very well. A morgen of Cocksfoot properly put down will be most valuable for sheep on a farm.

Worcester (Mr. J. D. Hugo).—Sown 5th July, 1906. Attribute failure to fact that seed was sown rather late in season.

Beaufort West (Mr. G. P. Pienaar).—Sown 1st July, 1906, and 1st August, 1906. Result: Good. Sown rather thickly on unirrigated land broadcast, somewhat early. Weather cool and fair supply of rain. No manure applied. This grass seems to want cool weather. Horses and cattle exceedingly fond of it, also sheep. Consider it quite suitable for district and should pay.

Rosmead (Mr. W. E. Collett).—Sown October, 1906. Result: Good. Sown broadcast and rather thick on irrigated land. Germinated badly, only a few plants grew. It promises well when once started, and will pay if you get a thick crop. Intend sowing again at different times to find out the best time for getting it to seed well before the winter.

Colesberg (Mr. G. Meiring).—Sown 27th August, 1906. Result: Bad. Not suitable for district, and do not think it will pay. Crop a failure.

Tarka (Mr. A. Paetzold).—Sown 20th August. 1906. Result: Indifferent. Seeds germinated slowly. Weeds got the upper hand. Sown broadcast and thickly on irrigated land. Succeeded in pasture grown with other grasses. Trial not decisive.

Barkly East (Mr. C. F. Smart).—Sown 17th December, 1906. Result: Uncertain. Sown thickly and broadcast on unirrigated land. Weather fairly wet. After three weeks were eaten off by small green fly. I think is suitable to district I think I was mistaken in delaying so long before sowing, although some of my neighbours maintain January is the best month.

Vryburg (Mr. Sidney C. Smith).—Sown 23rd November, 1906. Result: Poor. Sown broadcast and thinly on unirrigated land. Germination and growth poor. Destroyed by locusts. Not reaped.

Cathcart (Mr. H. de Wilton Smith).—Sown 1st November, 1906 Result: Good. Sown broadcast and thickly on unirrigated land. Attacked by locusts three times in February. Suitable, and will pay in this district It promises to be a good winter grass.

Bedford (Mr W. J. Mapham).—Sown: No date given. Result: Failed to germinate.

Fort Beaufort (Mr. Henry Sinclair).—Sown 1st July, 1906. Failed to germinate

Adelaide (Mr. H. A. Morgan)—Sown 4th October, 1906. Came up well, but was killed by frost.

Grahamstown (Mr. A. A. Douglas).—Sown 31st July, 1906 Result: Very good. Sown broadcast thickly on irrigated land. Weather good Good return. Very hardy. Next year sowing it broadcast in the camp. Suitable for district.

Carlisle Bridge (Mr. W. S. Gradwell).—Sown 10th May, 1906. Result: Bad. Sown broadcast thickly on unirrigated land. No treatment. Not sufficient rainfall. Do not consider it suitable for district.

Uitenhage (Messrs. Martin & Co.).—Sown Spring Result: Fair. Sown in drills on irrigated land. Grew all right, but we cut the clovers twice before cutting this grass, although it was sown at the same time. Cattle do not like it so well as clover. It is a fine crop now, and appears to do better towards autumn. As stock do not eat it freely, we think clover much better to grow. Cannot say if it would do on dry lands.

Rescue Grass (Bromus Unioloides).

This grass was reported upon previously (*Agricultural Journal*, August, 1906), and further test, though not altogether favourable, still shows that in certain circumstances it has undoubted value. Although occurring wild so very generally in orchards and other cultivated land throughout the length and breadth of the Colony, it has as yet failed to receive that attention which its merits deserve. Most of the failures reported are attributable to sowing out of season or under conditions unfavourable to it. Rescue grass is not suitable for throwing out on the open veld, it likes well-tilled soil, and is generally found on land which

is irrigated. There can be no question of its extraordinary value as a winter grass, providing feed at a time when other greenstuff, especially grass, is scarce, and it would appear well adapted for a mixture for paddocks to furnish fresh grazing at a time when other grasses are dormant. For ideal artificial grass lands a succession is essential, and rescue grass may be relied on to fill up a time of winter scarcity and to way in warm weather to other kinds. In procuring seed of this grass care must be exercised to ensure that the buyer gets precisely what he asks for, as there are other less suitable grasses, the seed of which much resembles that of *B. unioloides.*

Elliot (Mr. T. L. Thompson).—Sown April, 1906. Result: Good. This grass grows and flourishes in every cultivated land or garden, and is very suitable for the poor soil of the district. Frost has no effect on it.

Ugie (Mr. S. T. Lake).—Sown 18th December, 1906. Result: Bad. Sown broadcast and thinly on unirrigated land. This grass is no good.

Tarkastad (Mr. A. Paetzold).—Sown 20th August, 1906. Result: Failure. Sown broadcast on irrigated land. Germinated badly, and had to be ploughed up on account of weeds. Sown as pasture in May with other grasses under experiment succeeded well.

Dordrecht (Mr. E. V. Birch).—Sown 1st November, 1906. Failed to germinate.

Bedford (Mr. A. G. King).—Sown: No date given. Result: Bad. This grass has not done well, only a few seeds came up.

Highlands (Mr. Frank S. Tuberville).—Sown 16th March and 31st December. Result: Poor. First sowing came up well, but only grew to 6 inches after two months; was ploughed in. Second sowing failed to germinate. Unsuitable.

Cathcart (Mr. H. de Wilton Smith).—Result: Good. Sown broadcast and thickly on unirrigated land. Fairly suitable for district. I have great hopes for this grass as being a good spring grazing. Does well on good soil. Eaten three times by locusts in February.

King William's Town (Mr. W H. Manley).—Sown 27th September, 1906. Result: Good. I consider this a very good grass for the district, it shoots early and makes excellent winter grazing.

Port Elizabeth (Mr. F. Cecil Drake).—Sown 8th October, 1906. Result: Indifferent. Schraeder's grass seems the most suitable of the three varieties sent, but I am of opinion that even this grass cannot be grown with success except on cultivated lands.

Graaff-Reinet (Mr. F. J. Haarhoff).—Sown 1st April, 1906. Result. Very good. Consider it better than barley for green forage. Horses and farm animals prefer it to oathay or any other forage. Should pay well.

Beaufort West (Mr. W. G. Rice).—Sown 29th October, 1906. Result: Good. Suitable for district under cultivation. Cannot judge yet, but it is growing very fast again since it was eaten off by locusts. Will report again if the locusts keep off from now.

Wellington (Mr. L. Abrahamson, M.L.A.).—Sown September, 1906. Result: Good. Sown broadcast on irrigated land. Consider it suitable for district, and should pay to cultivate this grass.

Hermon (Mr. J. W. Mason).—Sown 28th July, 1906. Result: Good. Germinated well, grown about 1 foot long and seeded heavily. Suitable for district.

Elsie's River Halt (Mr. J. Courtnay).—Sown July. Result: Bad. Did very badly and died off.

Caledon (Dr. Viljoen, M.L.A.).—Sown 1st September, 1906. Result: Good. Rescue grass is a good winter, spring and early summer grass. I intend to give it further attention this year. Suitable for this district, and will pay.

TIMOTHY (ALOPECUNIS PRATENSE).

Of about thirty reports which have now come to hand there are very few which condemn Timothy as a failure, and some that speak very highly of this grass. Timothy is likely only to succeed in our moister and more fertile areas, grass-veld, vleis and along the coast. Occasionally it has grown so high as to be suitable for hay, but generally it has been regarded and better suited for grazing for cattle, horses or sheep. It seems well adapted to form part of a mixed pasture. In several instances, evidently

sown out of season, it has failed to germinate. Locusts also took their share. It may therefore be considered that Timothy grass is likely to prove of service in our more moist and equable regions, and deserves to be included in a mixture of artificial grasses, such as are beginning now occasionally to be met with in districts where natural grass is scarce. Of its palatability, fine quality and high nutritive value, there can be no question.

East Griqualand (Mr. L. Conolly).—Sown January. Result: Fair. This grass will pay in wet seasons, otherwise not.

East Griqualand (Mr. R. N. Forrester).—Sown February, 1906. Result: Good. Is both suitable, and will pay in this part.

Elliot (Mr. T. L. Thompson).—Sown January, 1906. Result: Good. This grass grows well, and I think is suitable to the district, as with rescue grass. The frost does not affect this crop, making it valuable for winter grazing.

Griqualand East (Mr. W. E. Jelliman).—Result: Good. This grass came up well, but unfortunately it was mostly washed away by severe thunderstorms.

East Griqualand (Mr. W. F. Raw).—Sown 5th December, 1906. Result: Fair. A suitable grass to mix with others, but alone will not pay.

East Griqualand (Mr. D. B. Menne).—Sown 7th November, 1906. Result: Bad. Practically a failure. Came up a little better than meadow grass.

Ugie (Mr. S. T. Lake).—Sown 22nd December, 1906. Result: Good. Sown broadcast and thickly on unirrigated land. I consider this a good grass for sheep. Suitable and will pay in this district.

Ugie (Mr. C. N. Lake).—Result: Indifferent. Sown broadcast and fairly thick on unirrigated land. Seed all came up and then seemed to disappear. The few plants growing look well.

Bolo (Mr. Paul Horn).—Sown 18th September, 1906. Result: Poor. I think this grass will do if sown in early spring, and irrigated. Took the rust five weeks after it appeared above ground, and is growing very slowly now.

Bedford (Mr. A. G. King).—Sown: No date given. Came up well, but was destroyed by locusts.

Bedford (Mr. W. J. Mapham).—Sown: 29th October, 1906. Result: Fair. Fairly suitable for district, but I think it requires a good rainfall to get it properly established.

Adelaide (Mr. H. A. Morgan).—Sown: 4th October, 1906. Destroyed by locusts, but up to time of destruction seemed to be doing well.

Cathcart (Mr. H. de Wilton Smith).—Sown: 1st November, 1906. Result: Fair. Sown thickly and broadcast on unirrigated land. Attacked by locusts in February. I have good hopes that this grass will be a good spring grass.

Tarkastad (Mr. A. Paetzold).—Sown: 20th August, 1906. Result: Fair. Sown broadcast on irrigated land. Germination about 50 per cent., but progress did not warrant going on with it. Weeds were very troublesome. Succeeded well where sown as pasture with other grasses. Suitable for this district.

Colesberg (Mr. G. Meiring).—Sown: October. Seed failed to germinate. Sown on vlei land.

Dordrecht (Mr. E. V. Birch).—Sown: No date given. Failed to germinate.

Caledon (Mr. Henry Metcalfe).—Sown: April, 1906. Result: Good. This grass is suitable for district, and will pay if permanent. Make fine grazing for paddocks.

Caledon (Mr. J. S. le Sueur).—Sown: 27th August 1906. Result: Failure. Seed did not germinate. Was sown broadcast and thickly on unirrigated land.

Bredasdorp (Mr. J. D. Albertyn).—Sown: 5th June. Failed to germinate. Sown on sandy loam, very rich soil, broadcast. Land not irrigated.

Hermon (Mr. P. J. D. Wessels).—Sown: 6th June, 1906. Result: Indifferent. If sown early, say about April, should do well in this district. What I have sown is still living, but needs plenty of water.

Hermon (Messrs. Bresler and Co.).—Sown: 27th June, 1906. Result: Disappointing. It is possible that the plot of ground chosen was the wrong kind of soil, and I would not like to condemn a grass that might be a useful one, but so far the result has been disappointing, more so as the native grasses did not choke it.

Malan Siding (Mr. Wm. McMillan).—Sown: 23rd June, 1906. Did not germinate.

Elsie's River Halt (Mr. J. Courtnay).—Sown: June. Result: Bad. The seed, after coming up fairly well, died off, probably owing to drought and poor nature of soil. I think there are better grasses more suitable for this district.

Bellville (Mr. C. P. Smuts).—Sown: 4th May, 1906. Failed to germinate.

Knysna (Mr. J. J. Hooper).—Sown: April and July. Result: Excellent. Thrives well. Excellent crops now maturing. So far it has answered well.

Knysna (Mr. E. Bibbey).—Sown: 15th August, 1906. Result: Indifferent. Seed sown too thick, otherwise it might have done better.

Knysna (Mr. G. A. Palmer).—Sown: 29th October, 1906. Result: Indifferent. This grass has not flowered this year. I should say it does not do in sandy, clay soil.

Storms River (Mr. E. Schmidt).—Sown: 5th November, 1906. Result: Fair. Sown broadcast on unirrigated soil. Used for grazing. Too early to offer an opinion. Might be profitable to sow more for grazing.

Uitenhage (Messrs. Martin and Co.).—Sown: Spring: Result: Good. Sown on drills on irrigated land. Grew all right, but clovers do better. A fine crop and looks well, and appears to flourish best towards Autumn. As cattle do not like it I should prefer to sow clovers.

Grahamstown (Mr. A. A. Douglas).—Sown: 31st July, 1906. Result: Fair. It seems rather a delicate grass, and soon burns off on approach of warm weather. Suitable for this district when under irrigation.

Meadow Grass (Poa pratensis).

Further experience confirms the previous opinion formed of this grass, that while occasionally successful, yet on the whole and compared to other sorts it does not merit praise, nor is it to be further recommended. This grass is constantly being enquired for under the name of Kentucky Blue Grass, being well known in Europe, where it is very popular for pastures and lawns. The weight of evidence here is, however, against it, although occasionally it is known to have grown well.

Stellenbosch (Mr. A. Nicholson).—Sown: 7th May, 1906. Germinated well, but died away directly dry weather came.

Bredasdorp (Mr. D. P. du Toit).—Sown: May, 1906. Frost destroyed it in July.

Fort Beaufort (Mr. H. C. Webb).—Sown: March, 1906. Sown broadcast on irrigated land. Kept moist by irrigation until seed was up, and then watered regularly. Wet regularly once a week. Weather dry. It seems a very delicate grass, and more suitable for lawns than for general use.

Mount Frere (Mr. J. H. Bennington).—Heavy storms may have washed seed away. Coming up badly, only noticeable in a few places.

Ugie (Mr. S. T. Lake).—Sown: 8th February, 1906. Result: Good. Sown broadcast and thickly on unirrigated land. Farmers should try it for winter feeding instead of turnips. Very fast grower, and keeps green. Suitable, and will pay in this district.

Carnarvon (Mr. J. D. Bester).—Sown: 7th June, 1906. Seed did not germinate. It might grow in this district, but I think our winters are too cold and soil brackish.

Robertson (Mr. Jac. S. Bruwer).—Sown: Early July. Result: Good. I consider it suitable for district. A fine grower. Very fit for cattle, etc.

Beaufort West (Mr. G. P. Pienaar).—This grass does not seem to answer here.

CORRESPONDENCE.

Correspondence and contributions are invited on all subjects affecting the Farming Industries of South Africa, suggestions for consideration or hints as to improved methods being particularly welcome. It should in all cases be distinctly understood that we do not hold ourselves responsible for opinions expressed or statements made.

Questions are also invited. In this department, every endeavour will be made to procure the desired information for publication in the next issue, but this cannot be guaranteed in the case of letters received after the 20th of the month. Should a correspondent deem his enquiry urgent, he should say so, and an answer will be returned *through the post* as soon as possible.

All letters or contributions should be plainly addressed: "The Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town"; they should be written on one side of the paper only, and be accompanied by the name and postal address of the writer, not necessarily for publication, but as a guarantee of good faith. A *nom de plume* may be attached for publication.

Jointed Cactus—A Correction.

To the Editor, AGRICULTURAL JOURNAL.

SIR,— Will you please publish the following letter as I was misreported at the meeting in Bedford, and the mistake is a serious one:—

To the Editor of the *Midland News*.

SIR,—In your report of the meeting of the Bedford farmers *re* jointed cactus you make me say that as far north as I have travelled I have found the jointed cactus. Now I said, "look at the burrweed which is in the hands of the Divisional Councils. As far north as I have been I have found the burrweed."

Now I must say that if the jointed cactus had got that far it would be quite out of hand, which is not the case. It is now only on a limited area and can be dealt with. But at the rate that it is increasing, it will not take many years, *if neglected*, for it to be quite out of hand. After the meeting Mr. Pringle took me out to Mr. Bouchier Bowker's farm, near Bedford. Now he—Mr. Bowker—had a great quantity of the jointed cactus upon his farm when he bought it, and, if I remember rightly, he said it had cost him £1,700 to clear it. Then he told us that if he had known as much at first as he does now he could have done it at a third of the cost. Then he used to cut up the plants, pack them in heaps, and spray the whole over with scrub exterminater. Now he finds that by mixing arsenite of soda, three of water to one of arsenite, and watering the growing plants with the mixture by means of a watering can the bulb and all is killed. Anyone having the cactus upon his farm will do well to go and see Mr. B. Bowker and get some tips from him, as he has had a very bitter experience of the weed.

I wish to record here that the thanks of all farmers are due to the Bedford Farmers' Association, and very particularly to Mr. Evans, for bringing the matter so prominently before the public, and I hope drastic measures will be resorted to as soon as possible to rid us of this fearful calamity which, if allowed to spread, will rid us of our country.

Trusting you will insert this in your next issue.—Yours, etc.,

D. B. BOWKER.

Doornberg, September 2nd.

The Classification of Ostrich Feathers.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Could you possibly find room in one of your coming issues for a short article, or even a note, on the proper classification of ostrich feathers? If so, you would confer a great boon upon a large number of ostrich farmers All men with birds are

alive to the advantages of a proper classification of the feathers. But most have not the requisite knowledge. Many have tried, but when *hoc facto* they have placed the feathers on the market they have almost invariably been informed that the feathers were improperly classed. Consequently they reluctantly regard it as beyond their scope. And the Jew buyers batten finely on this apathy. For they naturally prefer to buy at one price all over for wings and one for short stuff. Knowing how to place the feathers at a glance and with current market prices for each class before them they have an enormous pull in making a deal. So if you could come over and help us Gentiles by giving us in the *Agricultural Journal* a short succinct statement of the qualifications which a feather should possess to be classed respectively as Super Fine, First, Seconds, Femina, Supers, Long Blacks, Medium Blacks, Long Drabs, Medium Drabs, etc., much good would accrue to us. For if all farmers did not—as a result of your enlightening—sell their feathers classed, they would at any rate be enabled to arrive at a fairly correct estimate of their value. And then the feather buyer would not get all the gilt on the gingerbread of this little boom in "birds"—*Cela va sans dire.* At present it is a case of "and Israel spoiled the Egyptians."—Yours, etc.,

"MACEDONIAN."

Highlands, August 27th.

Not being feather experts, and not having a person on the staff qualified to write on this subject, we regret that we cannot help "Macedonian." But if any qualified person would contribute the information required we would gladly publish it. One question arises, however, which should call for consideration. Is it possible, with extended experience and merely from a printed description, for the average farmer to acquire technical knowledge of this description? Is not feather sorting and valuing a business by itself? The obvious remedy is to have nothing to do with the peripatetic buyer, but send all clippings to recognised *bona fide* dealers at the large centres.—Editor *Agricultural Journal.*

The Imperial Windmill.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—As most of the farmers seem keen on irrigation and the cheapest way to get water on their lands, it may be of interest to some to know we have two "Imperial" windmills at work. One was put up on the 16th May, 1906, and has been running ever since. It cost up to May 16th, 1907, £1 1s., for oil and 10s. 6d. for repairs; the other was put up on the 8th January, 1907, and is also giving every satisfaction. Anyone who intends putting up windmills we would be pleased to meet at Barkly Bridge and bring them on the farm merely to show them what can be done with the "Imperial."—Yours, etc.,

M. H. COURLEY & SONS.

Orange Grove, P.O. Barkly Bridge, September 6th.

The Valuation of Farm Properties.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I am directed by the Tent Kop Farmers' Association to write to you to ask you through the medium of your correspondence pages to make known to our brother farmers our opinion of a point which we consider to be of great importance to the Colony, and more particularly to its less developed portions, of which this district is one, and to obtain if possible, an expression of the general opinion of the Cape Colonial farming community. The point on which we wish an expression of opinion is the present system of valuation of immovable property for taxation purposes. The present system of taxation on gross values is in our opinion an inducement to land-owners to improve as little as possible, as for all improvement made additional taxes have to be paid. If all Cape Colony were occupied and improved this might be perfectly just, but where large areas of valuable land alienated from the Crown are lying idle, or practically so, we consider that in the best interests of the Colony no impediments should be put in the way of development. On this account we consider

that immovable property should be divided into three classes: (*a*) unimproved ground values; (*b*) unproductive improvements; (*c*) productive improvements. That classes "a" and "b" should be taxable and include land, dwelling houses, shops, etc., and that class "c" should be free and include all crops including trees, and all buildings required for the production of produce both raw and manufactured.—Yours truly,

LAWRENCE C. FRENCH,
Hon. Sec. Tent Kop Farmers' Association.

Maclear, August 31st.

Lime and Sulphur Dip.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the August number of the *Agricultural Journal* appears a letter signed "Elliot Farmer," criticising some statements in a former issue, and also giving experiences, etc.

I see nothing inconsistent in Mr. Probart's statement that he dipped four times. The sheep were possibly cleansed after the first two dippings, but perhaps through the medium of scab infected krantzes, in which places sheep will naturally seek shelter during inclement weather, became re-infected.

He further goes on to tell of two clips sent from this district and sold in East London, presumably on the same date, the scabby dirty clip realising ¾d. per lb. more than the clean. Now, is it probable that wool buyers, men who, for every bale handled by Elliot Farmer, go through hundreds of bales of wool, would commit such a blunder? I take it, a wool buyer is an expert appointed to that position because of knowledge of his business, and not for the fun of the thing. Now to take the six times dipped clip. Evidently the owner was determined to keep his sheep clean, but on account of the heavy rains last summer—36·93 inches from October 1st to March 31st registered here—the lasting effects of the dipping were nullified, the sheep being possibly re-infected as above stated.

But to jump to conclusions that because six times dipped the wool was scabby and dirty, is going beyond the mark of reason. It was more likely, taking the amount of rain into consideration, to have been clean and light, though perhaps slightly off-coloured.—Yours, etc.,

ANOTHER ELLIOT FARMER.

The Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have read with interest several letters appearing from time to time in your *Journal*, either upholding or condemning the use of the divining rod. In your July number "Sceptic" enters the arena.

He has never seen a divining rod, nor does he know how the instrument is used, yet he condemns it. Well, Sir, I think it is obvious that "Sceptic" should not deny the *bona fides* of the rod until he has not only seen it used, but put it to the test.

I do not wish to pose as an expert water-finder, nor do I practise as such, but I am in a position to point out to "Sceptic" sites that I have indicated with rod (for a few of my friends—without fee), which have been successfully bored. I have had a couple of failures, if I may call them so, due to the hardness of the rock encountered in the holes, and the incapability of the operators of the drills to temper their bits sufficiently, or I may say efficiently, to overcome the difficulty. I maintain, had these difficulties been overcome, water would have been found. I am not sufficiently versed to enter into controversy on the geological formation of underground dykes, but I can quote an instance where water-washed pebbles were brought to the surface by a bore-drill from one of the successful bore-holes alluded to, indicating to my mind, a stream or flowing water. I may say I have traced such streams for considerable distances, and whether the same be leakages from dykes or otherwise, I should say the correct word to use for these is "streams," and not leakages. I cannot account for the working of the rod, nor do I believe the many theories put forward by a good many people, but I hold that the divining rod has fully justified its use.

In conclusion I may say I have honestly and conscientiously used the rod to the best of my ability, and I would like to ask "Sceptic" why the Almighty created

underground water if He did not mean it for the use of man in various ways, and if so, He would surely furnish man with the simple means of treating it, without referring to scientists, when he wishes to utilise any of this underground supply. Trusting this will find space in your valuable *Journal.*—Yours, etc.,

C. A. FINCHAM.

Bolotwa, August 10th.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The August number of the *Journal* contained two distinct references to the divining rod. The argument is becoming acute. It is threatening to form another line of cleavage in the country. It is absurd to debate whether the water-stick is a useful instrument or not when a simple test can decide it.

When a contention contrary to all preconceived ideas of the universe is brought forward it is customary for its sponsors to nurse it. And the country expects the divining-rod men to break this mysterious force to utilitarian harness, and expects also that the unsupported word of the operator will be no link of the gear.

Mr. Biggs has gone a long way towards the solution of the problem. He has found that an artificially induced current in a metal pipe produces this strain on the stick. By piecing together his statements we arrive at the following assertion :—That any number of operators with the divining-rod when blind-folded could, within "a foot or so," corroborate one another in finding the water-mains of a city, providing that water was flowing at the time in the pipes and that they were not shod like Cinderella with glass. This is a remarkable contention. The converse, I presume, would also be true. That knowing the position of the main they could definitely say whether water was running. I have, like Mr. Biggs, the welfare of the country at heart, and I beg him and his friends with all courtesy to give us a demonstration at the next Port Elizabeth Show. If they come through satisfactorily there will be no further need to deplore their want of scientific training. Such interest will be aroused in the matter that scientific aid will speedily be forthcoming.

It is curious that the divining-rod men should be so slack about experimenting with themselves. They have a "gift" that judiciously cultivated might make them millionaires in life, and their names would be handed down to undying fame with those of Newton, Röntgen, Crookes and Marconi.—Yours, etc.,

HENRY FRANCIS.

Steynsburg, August 24th, 1907.

Krimpziekte, Bots, Lungsickness and Lamziekte.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Having read Mr. J. H. Van Niekerk's enquiries *re* the above sickness, I may state I have tried a good many remedies but they have all failed. I came up to these parts in 1897 with two hundred Merino ewes. I lost about thirty of them. Those that got sick I left at home, but none pulled through. The only advice I can give him is to move with the stock to another part of the veld, that is what I did, and never have had the sickness since. It is a kind of herb they eat. I think mostly on the Koppies veld. Also about Bots. The best thing that I have used is buttermilk and paraffin—about half a small cup of paraffin into half a bottle, then fill up with buttermilk. If you have no buttermilk then one can use sweet. I also notice in the *Agricultural Journal* the fuss that is made about Lungsickness. What is it? I would rather see lungsickness three or four times before I would like to see Lamsickness once. We have a cure or prevention for lungsickness, but for lamziekte none. I think that I have had a good deal of experience about lungsickness. Drenching is the best that I have found. To my idea, the virus taken from a beast that has died is the best and purest.

I have known the Kaap Range since 1880, when I first came up. It was not then so thickly populated as it is now, and one would hear of an ox here and there that died of lamziekte, but not much notice was taken until in 1882, when it got worse, when the veld was burnt. Then the Kafirs told us it was an old sickness, but never was so bad. It is getting worse every year, amongst small stock as well. We never knew of it down in Albania, near Belmont, and it is there now. Trusting you will excuse me for taking up so much space in your *Journal,* I may also mention that the Kaap is one of the best farming parts if it were not for the lamsickness and horsesickness.—Yours, etc.,

W. PRINGLE.

Klein Boetsap.

NOTES ON THE WEATHER OF JULY, 1907.

By CHARLES M. STEWART, B.Sc., Secretary to the Meteorological Commission.

Exceptionally high atmospheric pressure, warm, sunny days and cold nights, causing the mean temperature to be higher than the normal, frequent severe, killing frosts of daily and wide occurrence, unusually clear skies with very few fogs, light winds with frequent calms, a few local thunderstorms, an abnormally small rainfall, with some light falls of snow at the beginning and middle of the month, a few gales, and a moderate number of hot winds constituted the marked anticyclonic conditions prevailing in July.

DIVISION.	Mean Rainfall (1907).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Percent.
Cape Peninsula ...	1·58	4	6·39	12	—4·81	— 75
South-West ...	0·83	2	3·10	7	—2·27	— 73
West Coast ...	0·38	1	1·50	5	—1·12	— 75
South Coast ...	0·86	3	1·41	5	—0·55	— 39
Southern Karoo ...	0·41	2	0·64	3	—0·23	— 36
West Central Karoo ...	0·22	2	0·31	2	—0·09	— 69
East Central Karoo ...	0·29	1	0·24	2	+0·05	+ 21
Northern Karoo ...	0·20	1	0·34	2	—0·14	— 41
Northern Border ...	0·02	1	0·17	1	—0·15	— 88
South-East ...	0·12	1	0·62	2	—0·50	— 81
North-East ...	0·07	1	0·56	2	—0·49	— 88
Kaffraria ...	0·06	1	0·52	2	—0·46	— 88
Basutoland ...	0·21	2	0·64	2	—0·43	— 67
Orange River Colony...	...	...	0·48	2	.	.
Durban (Natal) ...	0·16	1	1·30	...	—1·14	— 88
Bechuanaland ...	0·00	0	0·33	1	—0·33	—100
Rhodesia ...	0·44	4	0·02	1	+0·42	+2100

Precipitation.—The mean rainfall, based on the records from 337 stations, amounted to only 0·42 ins. falling on 2 days, being 0·90 ins. or 68 per cent. less than the average, and less than half the amount recorded in June. The accompanying table shows that the deficit was practically general over all sections, ranging from "absolute drought" over Bechuanaland to *minus* 36 per cent. over the Southern Karoo. The only exceptions were the East Central Karoo, where there was an excess of 21 per cent., and Rhodesia, where the rainfall recorded was more than twenty times the usual amount. Compared with the previous month, there was a decreased mean over all divisions except Rhodesia, whilst "absolute drought" continued to prevail over Bechuanaland, as during the previous month. On summarising the monthly totals, it is found that "absolute drought" prevailed at 78 of the 339 stations, whereas 214 had 0·01—1 in.; 40 had 1·01—2 ins., and only 7 in the Cape Peninsula exceeded 2 ins. Of these last the largest was 2·94 ins. at Kasteel Poort (Table Mountain), Waai Kopje being next with 2·85 ins. Of the 214 having 0·01—1 in., 44 had 0·01—0·10 ins.; 124 had 0·11—0·50 ins., and 46 had 0·51—1 in. Consequently 23 per cent. suffered from absolute drought, and 50 per cent. from "partial drought" during the month. From what has been already stated, it will be anticipated that the maximum precipitation in one day would be nowhere very great, only 23 out of 333 stations having over 1 in. in any 24 hours, 232 having 0·01—1 in., and 78 having "Nil." The heaviest fall was 1·67 ins. at Plumstead on the 17th, Kenilworth being second with 1·63 ins., and Bishopscourt third, with 1·56 ins., both also on the 17th. On this particular date falls of over one inch were common over the Cape Peninsula and the South-West; similar quantities fell only over the additional division of the South Coast. *Thunderstorms* occurred at altogether 6 stations, 5 recording this phenomena on the 13th, and one (1) on the 18th. *Hail* was noted at Emerald Hill (near Port Elizabeth) on the 2nd. *Sleet* occurred at 9 stations on the 2nd, 3rd, 16th, and 21st, chiefly on the first two dates. *Snow* fell at 19 stations on the 2nd, 3rd, 4th, 17th, and 18th, principally on

the 2nd and 3rd, where it was reported from stations in the division of Wodehouse, along the Amatola, Kologha and Zwartberg Ranges, at De Kruis (Murraysburg), Richmond, in the South-West; on the 17th snow fell on Table Mountain, at a few stations in the South-West, and on the Outeniqua Mountains. On only four previous occasions since 1841 was the Royal Observatory rainfall in July less than the 1·38 ins. recorded this month, the lowest being 0·74 ins. in 1844; the other smaller quantities were 1·23 ins. in 1841 and 1877, and 1·15 ins. in 1875.

Temperature, Cloud and Winds.—The mean temperature of all stations was 53·2°, which is 1·0° higher than the average, and 0·5° above the mean for June last. The increase in temperature was entirely due to the days being much warmer than usual, the mean maximum (66·6°) being 2·0° above the normal, and 3·0° warmer than last month. The mean night temperature (39·8°) was the same as the average, but 2·0° colder than in June. The maximum and minimum temperature curves, therefore, show the usual divergence from each other during this month, the days being warmer and the nights colder than in the preceding month, although the effect of insolation this month has been to make the mean temperature higher instead of lower than in June. The mean temperature was considerably above the average in the West and South, and at a few stations in the interior, particularly over the Cape Peninsula, but below the normal over the greater portion of the interior and in the East, the excess ranging from 3·4° on Table Mountain to 0·1° at Hanover, whilst the deficit varied between 4·0° at Hopefountain and 0·3° at Amalienstein, being generally between 1 and 2 degrees. The mean maximum was above the normal over the greater part of the country by amounts varying between 0·2° at King William's Town, and 5·6° at Cape Town, although a few stations in the West were colder during the day by 0·1° to 1·5°, the deficit increasing to about 4° in Basutoland, and reaching 6·6° at Hopefountain. The night temperatures were above the average at most of the stations at or near the coast by 1·2 degrees, but colder than usual at most of the inland stations, particularly at Queenstown, where the mean minimum was 7·1° colder than the average; the Eastern were much colder than the Western stations during the nights. The mean daily range (26·8°) was 2° greater than usual. The mean warmest station was Port St. John's, with a mean of 60·4°, and the mean coldest, Hanover, with 43·0°, a difference of 17·4°. The highest mean maximum was 74·1° at Dunbrody, and the lowest mean minimum, 24·5°, at Hanover. The warmest days were most generally the 9th, 10th, 23rd to 26th and 29th to 31st, particularly the last date, and the 24th, although a few maxima were registered on other dates. On the other hand the coldest mornings were mostly those from the 2nd to 6th, and 17th to 21st, most numerously on the 4th and 5th, although isolated minima were recorded on the 15th and 27th. The usual cold spell in the middle of the month was not by any means so well marked, and being, moreover, somewhat later than usual. The mean of the highest readings was 76·7°, or 1·9° higher than in June, whilst the corresponding value of the lowest readings was 30·5°, or 2·8° lower than the previous month, showing a mean monthly range of 46·2° or 4·7° more than in June. The highest temperature at any station for the month was 84·0° on the 24th at Heidelberg, and on the 25th at King William's Town, whilst the lowest temperature was 15·0° on the 4th at Hanover, an extreme monthly range of 69·0°. The phenomenon of *Frost* was unusually common throughout, 856 cases being noted on the 31 days of the month, almost twice the number reported during June. They were least frequently noted from the 15th to 17th and on the 28th. At Queenstown the frosts were much more severe than usual, causing considerable damage to vegetation and scorching Pepper and Grevillea trees. Hoar-frost was seen on the grass at Sea Point on the 4th. At Kokstad the sap was stated to be rising rapidly in the trees and plants, and fear is entertained as to the effect of late frosts on fruit owing to the trees being much more advanced than usual. Citrus trees were nipped by frost at Sunnyside in the early part of the month. Almond trees were in full bloom at Sea Point on the 6th, and some peach trees had half their blossoms open by the 28th.

The mean pressure at the Royal Observatory was 0·08 ins. higher than the average, the weather showing marked anticyclonic conditions throughout the month. The mean percentage of *Cloud* was exceptionally low, except in the central portions of the High Veld, at one or two stations in Kaffraria, and at Hopefountain, in Rhodesia. The mean proportions of sky obscured was only 27 per cent., being 4 per cent. less than usual, and ranging from only 59 per cent. at Cape Point to 0·4 at Tabankulu. Over the Cape Peninsula and along the Coast it was mostly about 40 per cent., and 15 to 25 per cent. elsewhere, rising, however, to 46 per cent at Port St. John's, and 48 per cent. at Hopefountain. *Fogs and Mists* were exceptionally infrequent, only 55 instances of their occurrence being noted on 20 days—1st, 2nd, 11th, 12th, 15th, 17th, and 19th to the end of the month, being most numerous on the 16th, 28th, 30th, and 31st. The prevailing *Wind Directions* were Southerly to South-Easterly in the South-West, Easterly in Namaqualand, Northerly to Westerly, with frequent calms, along the South Coast and over the Eastern half of the Colony, but South-Easterly at Kenhardt, Hopetown and Hopefountain, and North-Easterly at Kimberley. Following the usual conditions attending high pressures, the winds were mostly light, the main force being only 1·49, corresponding to a mean velocity in the morning of 10·4 miles per hour,

somewhat less than last month. The Royal Observatory observations show a large excess of winds from S. and S.S.E., with smaller excesses from N.N.E., S.W., and W.N.W. The proportion of fine N.W. winds was the same as usual, but there was a marked absence of those from North, with a diminution of those from N.N.W., W., and S.S.W., and of calms. The mean force there was 1·16, corresponding to a decrease of 2·7 miles per hour compared with the average. *Gales* were reported from 18 stations on 8 days, chiefly the 2nd, 16th and 17th. *Duststorms* occurred at Keilands and Lady Frere on the 16th; and *Hot Winds* at 14 stations on 12 days, principally the 8th.

OBSERVERS' NOTES.

VRUCHTBAAR.—Very dry warm days and cool nights.

KERSEFONTEIN.—An extraordinary spell of dry weather since the second week in June, which has played havoc with the veld, and is beginning to affect the crops too.

THE TOWERS.—Very hot, dry weather. Veld suffering from drought.

SUTHERLAND.—Cold nights, very warm days.

THEEFONTEIN.—Warm, pleasant days. Frosts with ice every night except the 15th and 16th. Winds light and variable.

THE MEADOWS.—There has been no moisture this month in this district. At times the weather has been very cold.

WAVERLEY.—Perfect weather all the month, warm days, cold nights.

HUXLEY.—The weather this month remarkably quiet and warm during the day, but severe frosts during nights. Veld shooting fast; all stock in good condition.

MOUNT COKE.—There has been more snow and frost at Coke this year so far than in any other previous year during the twenty years I have been there.

SUNNYSIDE (Albany).—The early part of the month was a succession of frosty mornings, which nipped the Citrus trees. The weather during the latter part of the month was made up of dry N.W. winds. Crops sadly in need of rain. Cattle and stock still fat.

BOLOTWA (Contest).—The weather has been exceptionally free from the usual winter winds—N.W. Days bright and warm, with very sharp frosts at night.

LYNDENE.—The grass is entirely frosted and dried up. The bush veld is in splendid condition. The springs full, but water in the spruits diminishing. Sharp frosts at night, and hot days have prevailed throughout the month.

ELLIOTDALE.—No rain. Very windy throughout the month.

KOKSTAD.—Mornings very cold, during day mild. Splendid harvest of mealies. No prevalent disease.

SLAATE.—Heavy frosts, bright calm days, very little wind.

GROOT DRAKENSTEIN.—The remarkable spell of calm, clear weather which set in during the second week in June continued right through July, with only two rainy days; the days being very warm and the nights rather colder than usual. Rainfall very deficient. Mean temperature of month, 1·2° above the average; mean maximum of month, 4·8° above the average; mean minimum of month, 2·3° below the average. Rainfall 3·39 inches below the average, or less than one-third of average number of rainy days (2) were below the average (11).

QUEENSTOWN.—Very high barometer almost right through the month. Average temperature is, I think, the lowest amongst my records. Have never known such severe continuous frosts. Vegetation has suffered much. Pepper and Grevillea trees scorched and killed far down. A dead calm nearly the whole month.

KOKSTAD.—Calm, sunny weather, frequent frosts, high barometric pressure and a monthly mean temperature rather lower than the average for July mark the month. A refreshing rain of rather over a quarter of an inch fell on the 19th. The sap is rising rapidly in the trees and plants, and the usual fear of late frosts and consequent damage to fruit is felt, as the trees are more advanced than usual.

CARNARVON FARM.—July and June, 1907, may be recorded as records for mildness and absence of wind. I attach a Rain, Wind, Frost, and No Cloud report from July, 1901:—1901: Amount of rain, 0·37 in.; windy days, 16; frosts, 26; cloudless ays, 5. 1902: Rainfall, 0·49 ins.; windy days, 15; frosts, 22; cloudless days, 12. 1903: Rainfall, 0·18 ins.; windy days, 16; frosts, 23; cloudless days, 6. 1904: Rainfall, nil; windy days, 13; frosts, 24; cloudless days, 9. 1905: Rainfall, nil; windy days, 16; frosts, 24; cloudless days, 5. 1906: Painfall, 0·01 in.; windy days, 8; frosts, 15; cloudless days, 13. 1907: Rainfall, 0·13 ins.; windy days, 3: frosts, 23; cloudless days, 10. There have been only three windy days recorded

during this month. The nights have been sharp with frosts, and the days superb. Thousands of bags of grain are, however, sown, and not up, or only partially up, and unless good rains—a most unusual thing—fall in August, there will not be much of a "white crop" harvest. Dams and fountains are, however, strong and full. Locusts a thing of the past *pro tem.* No losses in stock so far.

SEA POINT.—From 7th to 13th time of exceptional dryness. Cards hanging on walls bending; walls cracking; wall-paper falling off walls; doors warping; linoleum curling up at edges, and many other unusual signs unknown at this season.

TEMPERATURE, JULY, 1907.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	65·8	45·4	54·4	79·4	9	37·0	4
Sea Point ...	67·1	49·0	58·0	80·1	10	40·2	4
Table Mountain (Disa Head)	59·7	45·5	52·6	70·5	23	34·0	18
Groot Constantia ...	65·7	47·4	56·6	78·0	10	36·0	17
Simonstown ...	67·7	50·2	59·0	79·2	10	44·0	18 & 19
Wynberg ...	66·4	45·5	56·0	77·5	11	37·0	18
Cape Town (S.A. College) ...	68·2	46·2	57·2	79·0	9	39·0	18
Danger Point ..	62·5	48·3	55·4	75·0	10	40·0	4, 5 & 6
Robertson (Plantation) ...	68·5	34·5	51·5	81·0	31	26·5	3
Wellington (Hug. Sem.) ...	65·2	41·1	53·2	76·0	23	32·5	3
Elsenberg (Agri. College) .	66·9	40·5	53·7	77·8	31	31·5	4
Groot Drakenstein ...	68·8	41·7	55·2	79·8	30	34·1	4
O'okiep ..	67·5	43·9	55·7	76·0	24	31·0	20
Van Staaden's ...	68·6	44·1	56·3	81·0	24	34·0	4
Cape Agulhas ..	62·7	49·9	56·3	79·0	10	41·0	4
Storm's River ...	68·8	44·3	56·6	84·0	24	34·0	5
Concordia (Plantation) ..	68·3	50·0	59·2	83·4	24	39·1	5
Uitenhage ...	72·9	36·6	54·8	84·0	24	29·0	6
Cape St. Francis ...	67·3	49·1	58·2	83·0	31	41·0	5
Dunbrody ..	74·1	36·7	55·4	83·3	31	25·0	5
George (Plantation) .	66·7	46·8	56·8	81·0	24	37·0	4
Port Elizabeth ...	69·5	48·4	59·0	83·0	31	42·0	5
Heidelberg ...	70·8	37·2	54·0	84·0	24	29·0	4
Emerald Hill, P.E. ..	68·9	51·5	60·2	83·0	31	41·0	3
Amalienstein ...	70·0	31·8	50·9	81·0	31	25·0	4 & 5
Murraysburg ..	62·0	28·5	45·2	68·0	23, 26, 28 & 30	17·0	3
Hanover ...	61·5	24·5	43·0	68·0	24, 26 & 29	15·0	4
Hope Town ...	65·7	29·4	47·6	74·0	23	18·0	4
Kimberley ...	67·9	34·9	51·4	74·2	17	28·0	6 & 21
Kenhardt ...	69·7	34·6	52·2	78·0	31	21·0	20
Bedford ...	66·2	38·0	52·1	78·0	25	27·0	20
King William's Town ..	73·2	38·1	55·6	84·0	25	28·0	4
Sydney's Hope ...	66·7	47·0	57·0	75·0	25	35·5	19
East London ...	69·4	46·5	58·0	81·0	18	40·0	5
Evelyn Valley ...	63·7	43·3	53·5	74·0	25	34·0	4
Queenstown ...	65·9	29·9	47·9	73·0	26 & 31	21·0	4
Aliwal North ...	65·2	26·3	45·8	70·0	26, 29 & 31	19·0	4 & 5
Rietfontein (Aliwal North) .	59·4	28·4	43·9	65·0	29	20·0	4
Tabankulu ...	66·6	38·9	52·7	72·6	31	29·5	6
Mt. Ayliff ...	70·0	39·7	54·9	77·5	31	30·0	4
Kokstad (The Willows) ...	64·5	29·1	46·8	71·8	18	20·0	4 & 5
Umtata ..	70·9	32·5	51·7	80·0	25	25·0	5 & 6
Port St. John's ...	70·8	50·0	60·4	80·0	13 & 26	41·0	15
Teyateyaneng ...	61·7	31·2	46·4	67·0	31	23·0	2
Mohalie's Hoek ...	60·6	29·6	45·1	65·0	14 & 30	17·0	4
Moyeni ...	60·0	28·3	44·1	65·0	21	18·0	3
Kuruman ...	65·5	33·0	49·3	71·0	22	23·0	5
Hope Fountain ...	62·4	41·1	51·8	73·1	18	34·1	27
Means ...	66·6	39·8	53·2	76·7	...	30·5	...
Extremes ...	...	...	...	84·0	24 & 25	15·0	4

RAINFALL, JULY, 1907.

I. CAPE PENINSULA:	INS.
Royal Observatory (a) 12 in. gauge	1·38
Cape Town, Fire Station ...	1·06
Do. South African College	1·29
Do. Molteno Reservoir ...	1·27
Do. Platteklip ...	1·81
Do. Signal Hill ...	0·94
Do. Hospital ...	
Sea Point, The Hall ...	0·94
Do. Attridge ...	0·95
Camp's Bay	1·10
Table Mountain Disa Head ...	1·86
Do. Kasteel Poort ...	2·94
Do. Waai Kopje ...	2·85
Do. St. Michael's ...	2·75
Do. Lower Reservoir	1·26
Devil's Peak Blockhouse ...	
Do. Nursery ...	
Do. Lower Gauge ...	
Woodstock, The Hall ...	1·28
Do. Municipal Quarry ...	2·56
Do. do. Nipher's Shield	2·71
Newlands, Montebello ...	2·06
Claremont, Carrigeen ...	
Bishopscourt	1·86
Kenilworth	1·84
Wynberg, St. Mary's ..	1·01
Groot Constantia	1·62
Tokai Plantation	1·37
Plumstead, Culmwood ...	1·93
Muizenburg (St. Res.) ...	
Fish Hoek	
Simon's Town, Wood ..	1·36
Do. Gaol ...	1·46
Cape Point	0·80
B aauwberg Strand	
Robben Island	0·56
Durbanville	1·11
Maitland Cemetery	1·28
Tamboer's Kloof	1·19
Woodhead Tunnel	2·15

II. SOUTH-WEST:	INS.
Eerste River	
Klapmuts	1·21
Stellenbosch, Gaol	1·39
Somerset West	1·35
Paarl	0·78
Wellington, Gaol	0·59
Do. Huguenot Seminary	0·76
Groot Drakenstein, Weltevreden	1·43
Porterville Road	0·69
Tulbagh	0 62
Ceres Road	
Kluitjes Kraal	
Ceres	0·40
The Oaks	
Rawsonville	0·67
Caledon	0·89
Worcester, Gaol	0·34
Do. Meiring	
Do Station	
Hex River	0·24

II. SOUTH-WEST (con.):	INS.
De Doorns	
Karnmelks Rivier	
Lady Grey, Division Robertson	
Robertson, Gaol	0·49
Do. Govt. Plantation ...	0·48
De Hoop	0·54
Montagu	0·60
Danger Point	0·98
Vygebooms River	1·69
Elgin Plantation	
Elsenburg Agricultural College	1·09
Berg River Hoek	
Wemmer's Hoek	
Roskeen	1·40
Vruchtbaar	1·20

III. WEST COAST:	INS.
Port Nolloth	
Do. Lieut. Barber ..	
Anenous	0·42
Klipfontein	0·33
Kraaifontein	0·00
O'okiep	0·35
Springbokfontein	0·41
Concordia	
Do. Kraphol	0·26
Garies	
Lilyfontein	0·27
Van Rhyn's Dorp	0·00
Clanwilliam, Gaol	0·19
Do. Downes ...	
Dassen Island	0·64
Kersefontein	0·47
The Towers	0·29
Abbotsdale	
Malmesbury	0·64
Piquetberg	0·87
Zoutpan . ..	0·54
Wupperthal	0·20
Welbedacht	
Hopefield	0·57

IV. SOUTH COAST:	INS.
Cape Agulhas	0·58
Bredasdorp	0·86
Swellendam	0·74
Potberg	
Zuurbrak	1·23
Grootvaders Bosch	
Heidelberg	
Riversdale	0·77
Melkhoutfontein	
Vogel Vlei	0·84
Geelbek's Vlei	
Mossel Bay	0·92
Great Brak River	0·46
George	0·72
Do. Plantation	0·68
Do. Woodifield	
Ezeljagt	
Millwood	0·72
Sourflats	0·94
Concordia	0·85

IV. SOUTH COAST (*con.*):

	INS.
Knysna	1·62
Buffel's Nek	1·67
Plettenberg Bay	1·46
Harkerville	1.90
Forest Hall	
Blaauwkrantz	1·24
Lottering	1·34
Storm's River	1·22
Witte Els Bosch	1·35
Humansdorp	1·98
Cape St. Francis	0·67
Hankey	
Witteklip, Sunnyside	
Van Staden's, Intake	0·85
Do. On Hill	0·68
Kruis River	0·32
Uitenhage, Gaol	0·18
Do. Park	0·15
Do. Inggs	0·15
Armadale, Blue Cliff	0·00
Dunbrody	0·04
Port Elizabeth, Harbour	0·54
Do. Victoria Park	
Do. Walmer Heights.	0·58
Shark's River, Nursery	0.91
Do. Convict Station	0·85
Tankatara	
Centlivres	0·02
Edinburgh, Knysna	1·87

V. SOUTHERN KAROO:

	INS.
Verkeerde Vlei	
Bok Rivier	
Triangle	
Touws River	
Do. D.E. Office	
Pietermeintjes	
Grootfontein	
Ladismith	0·72
Amalienstein	0·41
Seven Weeks' Poort	
Calitzdorp	0·20
Oudtshoorn	
Vlaakte Plaats	
Uniondale	0·60
Kleinpoort	
Glenconnor	0·10
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

	INS.
Matjesfontein	
Laingsburg	
Prince Albert Road	
Fraserburg Road	
Prince Albert	0·07
Zwartberg Pass	1·05
Booi's Kraal, Beaufort West	
Beaufort West, Gaol	0·10
Dunedin	0 25
Nel's Poort	0·13
Camfers Kraal	0·08
Lower Nel's Poort	
Krom River	0·10
Baaken's Rug	
Willowmore	0·16
Rietfontein	
Steytlerville	0·02

VII. EAST-CENTRAL KAROO:

	INS.
Buffels Kloof	
Aberdeen, Gaol	0·12
Do. Bedford	
Corndale	0·09
Aberdeen Road	
Klipplaat	0·04
Winterhoek	
Klipdrift	
Kendrew, Holmes	0·31
Do	0·25
Graaff-Reinet, Gaol	0·32
Do. Eng. Yard	0·39
Do. College	
New Bethesda	0·18
Roodebloem	0·31
Glen Harry	0·40
Wellwood	0·30
Do. Mountain	0·36
Bloemhof	0·16
Jansenville	0·18
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	
Toegedacht	
Klipfontein	0·38
Cranemere	0·37
Pearston	0·45
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek	
Middlewater	0·17
Somerset East, Gaol	0·63
Do. Do. College	
Longhope	
Cookhouse	0·30
Middleton	
Spitzkop, Graaff-Reinet	0·30
Bruintjes Hoogte	

VIII. NOORDELIJKE KAROO:

	INS.
Calvinia	0·10
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	0·10
Fraserburg	0·05
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	0·18
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·17
Victoria West	
Omdraais Vlei	
Doornkuilen	
Britstown	
Wildebeestkooij	
Murraysburg	0·28
De Kruis, Murraysburg	0·60
Richmond	0·50
De Aar	
Middlemount	
Hanover	0·03
Theefontein	0·13

VIII. NORTHERN KAROO (con.):	INS.
Zwagersfontein	
Philipstown	0·00
Boschfontein	
Petrusville	
The Willows, Middelburg	0·26
Naauwpoort	
Middelburg Gaol	0·13
Do.	
Middelburg Government Farm	
Jackalsfontein	0·26
Ezelpoort	0·26
Plaatberg	0·26
Grape Vale	0·26
Ezelfontein	0·26
Roodepoort	0·26
Groenkloof	0·26
Vlakfontein	0·26
Vogelsfontein	0·26
Plaatfontein	0·26
Rietfontein	0·16
Colesberg	0·00
Tafelberg Hall	
Rietbult, Colesberg Bridge	
Fish River	0·00
Varkens Kop	0·15
Culmstock	0·16
Droogefontein	0·00
Stonehills	
Cradock Gaol	0·20
Witmoss	0·20
Varsch Vlei	
Maraisburg	0·27
Steynsburg Gaol	0·14
Riet Vlei	
Hillmoor	
Quagga's Kerk	
Tarkastad	0·38
Do., Dis. Engineer	
Drummond Park	
Glen Roy	
Waverley	0·12
Gannapan	
Montagu	
Grape Vale	
Rietfontein, Cradock	
Schuilhoek	0·18
Vosburg	0·15
Zwavelfontein	0·47
Holle River, Colesberg	0·20
The Meadows, Schoombie	0·00

IX. NORTHERN BORDER:	INS.
Pella	
The Halt	0 00
Keimoes	
Kenhardt	0·06
Upington	0·00
Trooilapspan	0·03
Van Wyk's Vlei	0·23
Prieska	0·00
New Year's Kraal	0·00
Dunmurry	0·00
Karree Kloof	0·00
Griquatown	0·00
Campbell	
Douglas	0·00
Avoca, Herbert	
Hope Town	0·04
Orange River	

IX. NORTHERN BORDER (con.):	INS.
Newlands, Barkly West	0·03
Barkly West	0·00
Bellsbank	
Kimberley Gaol	0·00
Do. Stephens	0·00
Strydenburg	0·00
Rietfontein, Gordonia	0·00

X. SOUTH EAST:	INS.
Melrose, Div. Bedford	0·17
Dagga Boer	0·33
Fairholt	0·37
Lynedoch	
Alicedale	
Cheviot Fells	0·42
Bedford Gaol	0·40
Do. Hall	0·37
Sydney's Hope	0·27
Cullendale	0·24
Adelaide	0·14
Atherstone	0·18
Alexandria	0·55
Salem	0·00
Fort Fordyce	0·18
Fountain Head	
Graham's Town Gaol	0·16
Do. Do.	
Heatherton Towers	0·00
Sunnyside	0·15
Vischgat	
Fort Beaufort	0·00
Katberg	0·00
Balfour	0·00
Seymour	0·00
Glencairn	0·20
Alice	0·00
Lovedale	
Port Alfred	0·05
Hogsback	0·27
Peddie	0·00
Exwell Park	
Keiskamma Hoek	0·04
Cathcart Gaol	0·12
Cathcart, Forman	0·10
Cathcart	
Thaba N'doda	0·00
Evelyn Valley	0·07
Crawley	
Thomas Rivier	
Perie Forest	0·00
Forestbourne	0·09
Isidenge	0·04
Kologha	0·27
King William's Town Gaol	0·00
Do. Do., Dr. Egan	0·00
Stutterheim, Wylde	
Do., Besté	
Fort Cunynghame	0·08
Dohne	
Kubusie	0·05
Quacu	0·06
Blaney	0·00
Kei Road	0·00
Berlin	
Bolo	0·16
Fort Jackson	0·00
Prospect Farm, Komgha	0·00
Komgha Gaol	0·00
Chiselhurst	

X. SOUTH EAST (*con.*):

	INS.
East London West	0·00
East London East	
Cata	0·21
Wolf Ridge	0·17
Dontsah	0·04
Mount Coke	0·00
Blackwoods	0·05
Albert Vale, near Bedford	0·34
Heatherton Towers Irrigation	0·15
Huxley Farm, Stutterheim	0·03

XI. NORTH-EAST:

Venterstad	0·01
Mooifontein	
Burnley, Cyphergat	
Burghersdorp Gaol	0·00
Ellesmere	
Molteno	0·04
Lyndene	0·00
Cyphergat	0·16
Thibet Park	0·37
Sterkstroom Station	0·00
Do. Gaol	0·15
Rocklands	0·28
Aliwal North Gaol	0·00
Do. Brown	
Do. Dist. Engineer	0·00
Buffelsfontein	
Hex's Plantation	
Poplar Grove	
Carnarvon Farm	0·13
Halseton	0·16
Jamestown	0·00
Whittlesea	0·14
Queenstown Gaol	0·16
Do. Beswick	0·19
Rietfontein, Aliwal North	0·08
Middlecourt	
Dordrecht	
Tylden	
Nooitgedacht	
Herschel	0·00
Lady Grey	0·05
Lauriston	0·00
Lady Frere	0·04
Contest, near Bolotwa	0·05
Sterkspruit	
Doornkop	
Avoca, Barkly East	
Keilands	0·02
Palmietfontein	
Barkly East	0·05
Blikana	0·17
Glenlyon	
Rhodes	
Gateshead	
Cliftonvale	
Albert Junction	0·00
Queenstown, District Engineer's Office	0·20
Hughenden	0·00
Glenwallace	0·18
Indwe, District Engineer's Office	0·00
Bensonvale Inst., Herschel	
Cathcart, Queenstown	0·00
Royal, Div. Albert	
Lady Grey Station	0·00
Dordrecht, D.E.'s Office	0·01

XII. KAFFRARIA:

	ins
Ida, Xalanga	0·00
Slaate, Xalanga	0·00
Cofimvaba	0·00
Tsomo	0·00
N'qamakwe	0·04
Main	
Engcobo	0·02
Butterworth	0·00
Woodcliff	
Kentani	0·00
Maclear	0·00
Idutywa	0·00
Bazeya	0·00
Willowvale	0·00
Mount Fletcher	0·00
Somerville, Tsolo	0·06
Elliotdale	0·00
M'quanduli	
Matatiele	
Umtata	0·04
Cwebe	0·00
Tabankulu, The Residency	0·00
Mount Ayliff	0·16
Kokstad	0·28
Do., The Willows	0·29
Seteba	
Flagstaff	0·00
Insikeni	0·35
Port St. John's	0·13
Kilrush, Sneezewood	
Umzimkulu	0·21
Mandileni	
Wanstead	
Cedarville	
Maclear	0·00
Elliot Station	0·00

XIII. BASUTOLAND:

Mafeteng	0·09
Mohalies Hoek	0.33
Maseru	0·25
Teyateyaneng, Berea	0·00
Moyeni Quthing	0·22
Qacha's Nek	0·39
Leribe	
Butha Buthe	

XIV. ORANGE RIVER COLONY:

Bloemfontein	

XV. NATAL:

Durban, Observatorium	0·16

XVI. TRANSVAAL:

Johannesburg	

XVII. BECHUANALAND:

Taungs	0·00
Vryburg	0·00
Mafeking	
Setlagoli	0·00
Kuruman	0·00
Zwartlaagte	

XVIII. RHODESIA:

Hopefountain	0·53
Rhodes Matopo Park	0·34

XIX. DAMARALAND:

Walfish Bay	

DEPARTMENTAL NOTICES.

Introduction of Livestock into Orange River Colony.

The subjoined list of Ports of Entry for Livestock from the Cape Colony into the Orange River Colony, together with the conditions imposed by that Colony, is hereby published for general information, and will replace Notice No. 6 dated 8th October, 1906.

JOHN D. BORTHWICK,
Chief Veterinary Surgeon.

Office of the Chief Veterinary Surgeon,
Cape Town, 13th August, 1907.

Notice No. 2

PORTS OF ENTRY.

District of Bethulie.

Bethulie Road and Railway Bridges.

District of Boshof.

Farm Roseberry Plain (Welgevonden) No. 423.
Farm Reitpan.
Farm Charlottesdal No. 200, Smith's Kraal No. 309, and Olifantsfontein No. 366.

District of Fauresmith.

Dalton's Pont on Farm Welgedraai.

District of Jacobsdal.

Farms Ramah and Karree laagte.
Modder River Station on Farm Tweerivieren No. 43.
Kalkbult No. 176.
Schultznek, on farm Mauritzfontein No. 26.

District of Philippolis.

Norvals Pont Railway Bridge, and Colesberg Road Bridge.

District of Rouxville.

Great Head's Drift.
Odendaalsdrift abutting on farm Boschmansfontein No. 15.
Frere Road Bridge.

REGULATIONS.

(1) The introduction of any horse, gelding, mare, colt, filly, donkey, mule, or ostrich into the Orange River Colony will be prohibited, unless the owner shall have first obtained a Stock Removal Permit, as set forth in Annexure A hereto, signed by a Resident Magistrate, Field-cornet or Justice of the Peace or Government Veterinary Surgeon *of the district from which such stock are to be moved.*

(2) Horned cattle other than transport cattle will be admitted under the following conditions:—

(a) The person in charge of horned cattle introduced under this Proclamation shall obtain and have in his possession a declaration in the form set forth in Annexure "B" hereto, issued and signed before the Resident Magistrate of the District in Cape Colony from which such cattle have come, and a certificate signed by a Government Veterinary Surgeon of the Cape Colony in the form of Annexure "C" hereto.

(b) The person in charge of such cattle shall produce the declaration and certificate aforesaid to the Officer in charge of the Police Post or Customs at any of the Ports of Entry mentioned above, and such officer at the Port of Entry shall endorse his signature, his office and the date upon the said declaration and certificate and hand them back to the person in charge of such stock, and shall immediately send a copy of the said certificate to the Chief Veterinary Surgeon at Bloemfontein.

The said person in charge shall also be liable to produce the said declaration and certificate to any Justice of the Peace, Inspector of Stock, Member of the Police, or owner of land, etc., over which such cattle may pass or be passing upon the demand of such Justice of the Peace, Inspector of stock, Member of Police, or owner.

(3) Transport cattle will be admitted if accompanied by a certificate in the form set forth in Annexure "D" hereto, declared before a Resident Magistrate of the district in the Cape Colony from which such cattle have come.

Swine—Imported.

4. Pigs imported into Cape Colony by sea may be introduced into the Orange River Colony, provided that:—

(a) Such Pigs are conveyed direct from the port of landing to the Orange River Colony in closed trucks, such trucks having been properly disinfected at the port of landing; and

(b) A certificate, signed by a qualified Veterinary Surgeon at the port of landing that such Pigs were landed free from disease, and that the trucks in which they are conveyed were properly disinfected, accompanies each consignment and is produced at the Border Station

Sheep and Goats.

The entry of sheep and goats will be allowed only under the Orange River Colony Scab Regulations, and removal permits can be granted only by Cape Colony Scab Inspectors.

Annexure A.

Stock Removal Permit.

Permit No. .... Place..................

Date ....

Permission is granted to ....of ....to remove the undermentioned stock, the property of.............................. from .... to ..........................O.R.C.

Quantity and Description of Stock.

....

....

....

....

....

Signature of Resident Magistrate, Justice of the Peace,
Field-cornet or Government Veterinary Surgeon.

....

Note.—This Permit only remains in force for 20 days, including the day of issue, and must be shown on application, to any Officer entitled to demand its production under Stock Removal Ord. 52 of 1903.

ANNEXURE "B."

I hereby solemnly and sincerely declare that the whole of the undermentioned cattle have been in my possession for a period of three months and that no cattle have been introduced among them during such period and that they have been free from infectious or contagious disease and have not been in contact with infected animals during such period, and that they are now to the best of my belief free from infectious or contagious disease.

Number and general description .. ..

Place from which sent ....

Owner's name and address ....

Name and address of person in charge ....

Place and district in Orange River Colony to which cattle are going

....

And I make this solemn declaration conscientiously believing the same to be true.

Declared before me,

at..........................

this ... .. day of .

....

Resident Magistrate.

ANNEXURE "C." *

I hereby certify that the herein specified animals are to the best of my knowledge and belief free from infectious or contagious disease, and have not been in contact with infected animals and they are from a farm where the disease Pleuro-pneumonia has not existed for a period of three months immediately preceding this date.

Number .... Kind ....

General Description ....

Place from which sent ....

Destination in O.R.C. ....

Owner ....

Address ....

Name of person in charge ....

Address of person in charge ....

Place .... Signed ....

Date ....

* This certificate can also be signed by the following veterinary surgeons, viz.:—Joseph Buck, M.R.C.V.S., Kimberley; J. W. Crowhurst, F.R.C.V.S.; John Forrest, M.R.C.V.S.; J. T. Boase, M.R.C.V.S., Cape Division; E. Fern, M.R.C.V.S.; E. E. Stokes, M.R.C.V.S., Port Elizabeth.

ANNEXURE "D."

I hereby solemnly and sincerely declare that the whole of the undermentioned cattle are *bona fide* transport cattle and have been in my possession for a period of three months and that no cattle have been introduced amongst them during such period and that they have been free from infectious or contagious disease and have not been in contact with infected animals during such period, and that they are now to the best of my belief free from infectious or contagious disease, that they have not been de-

pastured, or been within three months of the date of their entry in the Orange River Colony, beyond an area in the Cape Colony of a distance of twenty-five miles from the boundary of the Orange River Colony.

Number and general description ....
Area in which cattle have been depastured . ...
Place from which sent ... .
Owner's name and address .. ..
Name and address of person in charge .. . .
Place and district in Orange River Colony to which cattle are going

.. ..

And I make this solemn declaration conscientiously believing the same to be true,
Declared before us,

at .. ..
this ... . . . day of . . . .

Resident Magistrate.

Introduction of Livestock into the Transvaal Colony.

The following amended conditions regulating the introduction of Livestock into the Transvaal Colony, as recently imposed by that Government, are published for general information, and will replace Notice No. 6, dated 10th July, 1905.

JOHN D. BORTHWICK,
Chief Veterinary Surgeon.

Office of the Chief Veterinary Surgeon,
Cape Town, 13th August, 1907.
Notice No. 1.

No. 1.—CATTLE.

Permits for the admission of cattle from Cape Colony into the Transvaal will only be issued upon application to the Director of Agriculture, Pretoria, and provided such application is accompanied by a certificate as set forth in Annexure "A" hereto, signed by the owner and countersigned by a Government Veterinary Surgeon, Cape Colony, setting forth that the cattle in respect of which such application for permit is made are healthy, and that there has been no case of contagious disease for at least three months previous to the date of such certificate upon the property on which such cattle have been.

N.B.—Where veterinary inspection is impracticable owners must forward to this office the above certificate for countersignature.

No. 2.—EQUINES.

All persons introducing equines into the Transvaal must produce certificates for their animals signed by a qualified Veterinary Surgeon holding the Diploma of the Royal College of Veterinary Surgeons, England, stating that the animals are free from disease and that they have been tested with mallein and all have reacted in a normal manner. These certificates will be collected by the Stock Inspector at the Port of Entry. If any horse is presented for admission without a certificate it will either be tested with mallein by the Stock Inspector, and allowed to enter after the Inspector is satisfied that the animal is free from disease, or it may be allowed to proceed to its destination and tested there, whichever course is most convenient for the Department.

EXCEPTIONS.

Equines which are engaged in to and fro movements across the border. Equines which have recently come from the Transvaal and are returning thither.

Racehorses in training will be allowed to proceed to their destination upon the owner giving an undertaking to report their arrival to the Government Veterinary

Surgeon of the District, and to submit the imported animals to the mallein test if the Government Veterinary Surgeon considers this necessary. All other equines will be detained and tested unless the owner has previously made other arrangements with the Department.

No. 3. -Sheep.

Sheep are subject to examination at the Port of Entry, and liable to detention if found affected with Scab

Annexure "A."*

I, the undersigned hereby certify that the undermentioned cattle sold by me to .... .have not been in contact with diseased animals, and that no contagious disease has existed on my property on which the cattle have been for the past three months.

Number... ... . .
Description . . . .
Address .. ..
Date .. . .

.. . .
Signature of Owner.

*This certificate can also be countersigned by Mr. Joseph Buck, M.R.C.V.S., Kimberley.

DEPARTMENTAL PUBLICATIONS.

The following pamphlets, reprints, etc., are obtainable on application to the Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town. Members of Farmers' and Fruit Growers' Associations applying for same through the Secretaries of these Associations are supplied free of charge.

Agricultural Miscellanea, price 6d. each. Extracts from Vol. I. to V. of *Agricultural Journal.*

Artificial Grasses and Fodder for Stock; Ensilage; Treatment of Cereal and other Crops; Viticulture and Wine Making; Forestry; Locusts and their Destruction; Possible New Industries for Cape Farmers; Dairying; Fruit Culture (6d.).

Agriculture.

Wheat Production in Australia (1s. 6d.) by A. C. Macdonald; *Wheat Production in Australia (1s. 6d.) by W. Halse and J. D. J. Visser ; Hop Cultivation (3d.) translated by A. W. Heywood; *Brak Land in Relation to Irrigation and Drainage (1d.); The Velvet Bean (1d.); Potato Disease (1d.); Scheme of Manurial Experiments (1d.); Leguminous Forage Crops for Trial in Cape Colony (1d.); Sundry Forage Crops for trial in Cape Colony (1d.); Poultry in South Africa: Rearing, Management and Improvement, with notes on Prevalent Diseases and Internal and External Parasites (3d.); The Salt Bushes (1d.); Tobacco Culture by P. Bornemisza (1d.); The Cultivation of Tobacco in the Colony by K. Schenck (3d.); Tobacco Wilt in Kat River Valley (1d.); *The Process and Appliances for the Flue Curing of Tobacco (3d.).

Dairying.

Dairy Breeds by A. C. Macdonald (9d.); *Dairy Industry in Great Britain by A. C. Macdonald (6d.); *Dairy Industry in Denmark (2d.); Ready Reckoner for Cream Testing (1s.); †Dairy and its Products by D. Hutcheon (2d.); *Cheddar Cheese Making (1d.).

Entomology.

The Bont Tick (1d.); Bean Bruchus (1d.); Cabbage Aphis (1d.); Codling Moth in Madeira Fruit (1d.); *Codling Moth (1d.); Fruit Fly (1d.); Fumigation Supplies (1d.); Insect Friends and Foes (1d.); Methods of Locust Destruction (1d.); *Peach Yellows (1d.); Pear Slug, Paris Green (1d.); Remedy for Mestwurmen (1d.); *Spray Calendar (1d.); *Spray Pump Notes (1d.); Scale Insects on Ornamental Trees and Plants (1d.); Two Pine Apple Pests (1d.); Tree Fumigation in California (1d.); Winter Spraying (1d.); Wattle Bag Worm (1d.); Bordeaux Mixture (1d.); Death Head Moth Superstition (1d.); Fumigation under Box Covers (1d.); The House Fly (1d.); New Oak Tree Pest (1d.); Nursery Inspection and Quarantine Bill (1d.); Potato Tuber Moth (1d.); The Codling Moth: Notes on its Life Cycle and Remedies (1d.); Gall Worms in the Roots of Plants (1d.); *The Fruit Fly (with coloured plates), (3d.); Another Introduced Scale Pest (1d.); Washes for Red Scale (1d.); Fruit Fly: Peach Fly Moth (1d.); Lime Salt Wash for Scale Insect (1d.); The Fruit Moth (1d.); Fusicladium of the Apple and Pear (1d.); Mealie Stalk Borer (3d.)—*coloured plate*; Cleaning up Nursery (1d.); Natural Enemies of the Fruit Fly: Report on Investigations in Brazil (1d.); Locust Birds and Locust Poison (1d.); The Brazil Fruit Fly Parasites (1d.); Cyanide Gas Remedy for Scale Insects (3d.); Arseniate of Lead (1d.); The Antestia Fruit Bug (1d.); Caterpillars Destroying Trees (1d.).

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

Forestry.

British National Forestry (1d.); Botanical Observations on Forests in Eastern Pondoland (1d.); †Elementary Principles of Sylviculture or Woodcraft (1d.); National Forests (1d.); Indigenous Timbers of the Cape (1d.); Misuse of Coal and the Uses of Forests (1d.); Tree Planting for Timber and Fuel (1d.); Tree Planting for Farmers (1d.).

Fisheries.

Trout and Carp Breeding and Stocking of Streams (1d.); *Methods of Preserving Fish by Smoking (1d.); Portable Floating Hatching Box for Trout Ova (1d.); The Protection of Trout (1d.); The Ocean and its Resources (1d.).

Horticulture.

Fruit Culture in the Gamtoos River Valley (1d.); *Marketing of Fruit (1d.); The Olive at the Cape (2d.); Tomatoes and Fruit for Export (1d.); Citrus Culture in Cape Colony: Report of the Citrus Commission (1d.); *Fruit from Orchard to Buyer (1d.); Netting for Fruit Trees (1d.); Fruit Culture in Argentina (1d.); Vegetables for Exhibition (1d.); Chrysanthemum Rust (1d.).

Veterinary and Animal Industry.

*Anthrax, Charbon, Mitzbrand or Miltziekte (1d.); *Heartwater (1d.); *Malarial Catarrhal Fever of Sheep (1d.); Rinderpest: Dr. Koch's Report (1d.); *Inoculation against Rinderpest (1d.); Dr. Kohlstock's Report on Inoculation for Rinderpest (1d.); *Redwater, Texas Fever or Tick Disease (1d.); *Redwater, Anthrax and Quarter Evil (1d.); *Sheep and Wool (1d.); The Eye and its Diseases (1d.); Husk, Hoose or Parasitic Disease of the Lungs of Cattle, Sheep and Pigs (1d.); Tick Heartwater Experiments (1d.); Indigestion and Diarrhœa in Calves (1d.); Persian Sheep and Heartwater (1d.); Poisoning of Stock (1d.); Retention of the Fœtal Membrane, or Afterbirth in Cows (1d.); Stijfziekte, Lamziekte or Osteo-Malacia and Paralysis (1d.); Tuberculosis and the Use of Tuberculin (1d.); African Coast Fever, with Description of Dipping Tank (3d.); *Rinderpest in South Africa (3d.) by D. Hutcheon; *Fluke or Slak in Liver of Sheep (3d.)—*coloured plate*; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte (1d.); Osteo Porosis (3d.)—*coloured plates*; *Glanders (3d.)—*coloured plate*; *Animal Castration (1d.); *Preventive Inoculation for Redwater (1d.); *Abortion in Cattle (1d.); Treatment for Worms in Domestic Animals (1d.); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia or Pleuro-Pneumonia-Bovum-Contagiosa (1d.); *Swine Fever, Hog Cholera or Pig Typhoid (3d.)—*coloured plates*; Castration of Females and Animals other than the Horse (1d.); Poisoning of Horses by ***Ornithogalum Thrysoides*** or Chinkerinchee (*coloured plate*) (3d.); Horse Sickness by D. Hutcheon (2d.); Ticks and African Coast Fever (1d.); Cirrhosis of the Liver in Stock (1d.); Liver Disease among Calves (3d.); The Arsenite of Soda Dipping Mixture (1d.); *Lampas; Preventive Vaccination against Anthrax.

Viticulture.

†Reports on Viticulture (3d.); *Reconstitution of Phylloxerised Vineyards (1s.); Report on Failure of Hanepoot Grapes on American Vines (1d.); The Making of Wine and its By-Products (6d.); How to Treat Wine Casks (1d.); Failure of Vines (1d.); Manufacture of Dry Wines in Hot Countries (3d.); Anthracnose in Constantia (1d.).

Miscellaneous.

Game Seasons (3d.); Land Laws of Cape Colony (1d.); †Monsonia: the Cape Cure for Dysentery (1d.); *Rainfall in South Africa (1d.); Sand Dunes of Gascony (5d.); The Metric System (1d.); South African Stud Book Constitution, Rules, etc. (1d.); Bars in Ostrich Feathers (1d.); *Information regarding the Mining Laws (1s.); The Preservation of Game in Cape Colony.

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 31st August, 1907, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D.* Mealies* per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	s d	s d	£ s d	s d		
Aliwal North ..	0 10 0	0 18 6	0 11 9	0 4 3	0 12 0	0 6 0	0 6 0	0 7 6	0 5 0	1 6 to 2/-	6d. to 8d.	6d. to 8d	1 9 to 2/-	0 0 9	£9 to10/10/-	15/- tot 19/-
Beaufort West ..	0 10 0	0 14 6	0 12 0	0 6 9	0 10 0	0 9 0	0 8 0	0 5 6	0 7 6	0 0 7	*6d., 1/-	*6d., 7d.	0 1 6	0 1 3	£15	20/6
Burghersdorp ..	0 7 9	15/-(bag)	0 11 6	0 5 0	14/-(bag)	8/-(bag)	18/-(bag)	0 6 0	0 3 0	0 0 8½	0 0 7½	0 0 5½	0 1 11	0 0 11	..	..
Cape Town ..	..	..	..	..	..	0 7 0	0 6 0	0 4 9	0 7 0	..	..	..	0 1 2	0 1 10	..	..
Clanwilliam ..	0 12 0	..	0 13 0	0 7 0	..	0 7 0	0 8 6	..	0 7 0	0 1 0	0 0 8	0 0 7	0 1 6	0 1 0	..	..
Colesberg	..	..	..	10/-(bag)	..	..	..	..	5 6 to 7/-	..	..	..	1/4 to 1/8	10 to 11d	..	..
Cradock	0 9 0	..	0 11 3	0 5 6	0 7 6	0 6 0	0 7 0	0 8 0	0 0 4	0 0 8	..	0 0 6	0 2 0	0 0 9	£10	16/-
Dordrecht.. ..	0 7 0	0 14 6	0 10 0	0 4 0	0 7 0	0 4 0	0 5 0	0 3 0	0 3 0	0 0 9	0 0 7	0 0 5½	0 1 9	0 1 0	£10	16/-
East London ..	0 7 0	0 11 0	0 8 9	0 5 0	0 8 0	0 5 0	0 5 0	0 5 0	0 6 3	0 1 6	*†0 0 7	*†0 0 7	0 2 8	0 1 0	£21	37/-
Graaff-Reinet ..	0 8 0	..	..	0 7 0	..	0 4 6	..	0 5 0	0 7 0	..	..		0 1 9	0 0 9	£9	16/-
Graham's Town ..	0 8 2	..	..	0 5 6	..	0 4 6	..	0 7 0	0 8 3	0 0 7	0 0 6½	0 0 5¼	0 2 4½	0 1 0½	..	..
Kimberley ..	0 10 0	0 15 0	0 13 6	0 5 0	0 6 0	0 7 6	0 7 9	0 6 6	Local 9/6 Other 7/6	0 0 7	0 0 10	0 0 8	0 1 4	0 0 9	£9 to £14	15/- to 20/-
King Wm.'s Town..	0 7 6	0 15 3	0 12 9	0 5 0	0 6 3	0 4 0	0 5 6	0 4 0	0 6 0	0 0 3½	0 0 6½	0 0 6½	0 2 0	0 0 10	£11 10s.	22/-
Malmesbury ..	0 8 6	0 14 0	0 10 6	0 6 6	0 7 6	0 7 0	0 6 0	0 4 0	0 9 0	0 0 10	0 0 6	0 6	0 1 3	0 1 0	£12 10s.	22/-
Mossel Bay ..	0 10 0	..	..	..	..	..	..	..	0 16 0	..	..	0 0 8	..	..	..	..
Port Alfred ..	0 8 6	0 15 0	0 14 0	0 5 0	0 10 0	0 5 0	0 6 0	0 5 0	0 7 6	0 0 6	0 0 6	0 0 6	0 1 6	0 0 6	..	..
Port Elizabeth ..	0 7 0	..	..	0 5 6	..	0 3 9	0 7 0	0 4 9	0 8 0	..	0 0 6	0 0 6	0 1 10	0 1 1	..	..
Queen's Town ..	0 9 0	0 15 6	0 12 0	0 4 6	0 6 6	0 4 0	0 8 0	0 5 0	0 5 0	0 0 9	0 0 6	0 0 7	0 2 0	0 0 9	£12 to £14	18/- to 22/6
Tarkastad.. ..	0 12 0	0 12 6	0 12 0	0 2 6	0 9 6	0 5 6	0 10 0	0 5 0	0 14 6	0 0 9	*0 0 4	*0 0 4	0 1 3	0 1 6	£10	20/-
Vryburg	0 12 0	0 17 6	0 14 0	0 6 3	0 8 0	0 7 6	0 8 0	0 8 9	0 12 0	0 0 7½	0 0 6	0 0 6	0 1 9	0 1 0	£10 to £12	15/-, 17/6
Worcester	0 9 3	0 14 0	0 10 3	0 6 3	0 7 6	0 7 0	0 6 6	0 5 0	0 8 0	0 0 5	*6d. to 9d. †5d. to 9d.	*5½d. to 6d. †5½d. to 6d.	0 1 6	0 1 0	£8 10s. to £13 10s.	22/6 to 24/6

NOTE.—A blank space denotes "no transactions. *Colonial. †Frozen.

THE Agricultural Journal OF THE CAPE OF GOOD HOPE.

No. 4. OCTOBER, 1907. VOL. XXXI.

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The Editor "Agricultural Journal," Department of Agriculture, Cape Town.
Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

NOTES.

The Economical Use of Irrigation Waters.

The Director of Irrigation has just issued a note on "The Economical use of water in Irrigation and the measurement of Stream and Irrigation Furrow Discharges," which has been published as a Parliamentary paper. It is the first of a series of booklets which he is preparing for the guidance of farmers. The second one on Irrigation pumping is now going to press, and will guide the farmer in simple language through all the difficult stages which have to be gone through in formulating a pumping scheme, in the selection of suitable plant, in working the plant, and in arriving at the cost of irrigating by pumping. This again is to be followed by booklets on small gravitation schemes and construction of dams, etc. The booklet now issued is procurable on application from the Director of Irrigation, Parliament Street, Cape Town; Mr. Newman, Circle Engineer, Grahamstown, or Mr. Scaife, Assistant Engineer, Robertson.

Government Guano.

The subjoined report of an analysis of Government Guano, which is now made of uniform grade, and includes Rock Guano, is hereby published for general information. Rock Guano is no longer supplied separately, but is mixed with the other collections.

Lime	12·54	per cent.
Potash	2·04	,,
Nitrogen	12·60	,,
Total Phosphoric Oxide	11·88	,,
Phosphoric Oxide, soluble in water	4·14	,,
Phosphoric Oxide, soluble in Citrate Solution	11·44	,,

South African Pines in London.

Speaking generally of recent shipments of pines to London, Mr. Chiappini considers too much grass was used for packing, and this causes heat. It will be far better to adopt a system of packing that requires the least possible amount of grass, just sufficient to keep the pines from shaking and damaging each other, and to tighten up the packing, but with as much ventilation as possible. For this reason, boxes containing one layer only stood upright should be tried, or small boxes, as previously recommended by the Trades Commissioner, packed in one layer of two rows, with the crowns inward so as to protect them. It is absolutely essential that the tops or crowns, should be in a good condition, as buyers attach as much importance to this as to the appearance of the fruit itself. They want to see a fresh large, green crown. Upon making enquiries from experts, they recommend that a covering should be adopted for the crown while the fruit is still growing, to protect it from the rays of the sun. Such covers are used in other countries, Mr. Chiappini is informed, and although it is made to keep off

the rays of the sun, it must at the same time admit air and a certain amount of light. The most suitable arrangement, the Trades Commissioner thinks, is to have small baskets made of rushes or thin reeds, similar to the small strawberry baskets, but deeper in shape, and place these over the pines during the last week or ten days previous to the fruit being cut. This would, it is thought, be an inexpensive arrangement, and it is suggested that experiments be made with them. The present time is not, of course, a good season for tropical fruit, as the market is full of all sorts of fresh fruits home-grown and from the Continent of Europe. The small "Queen" pines are making about 4d. each, though they are bad inside, and the sale is going very slowly. The "Giant Kew" would possibly be worth about 1s. 6d. each at present, and probably about 2s. 6d. to 3s. each during the months of February, March and April.

Cape Citrus Fruits in London.

Mr. Chiappini, the Trades Commissioner, has gathered the following information with reference to the exportation of Citrus Fruits to London: The boxes should be branded or stencilled on the outside with the name of the fruit, the "count," *i.e.*, the quantity, and the brand, mark or initials of the shipper. The fruit arrived in a good condition, and considering that it was shipped in ventilated holds or cabins, the Trades Commissioner thinks it is a very satisfactory experiment. Amongst the oranges there were a few rotten in each box, but this is quite usual even in oranges arriving from Italy and Spain. Mr. Chiappini examined the rotten fruit carefully, but could not ascertain the cause, unless it was over-ripeness. The rotten fruit does not in any way contaminate or affect the adjoining fruit in the box, though it makes rather a mess of the paper. Naartjes are best known in London as Tangerines, though Mandarins is also a little known. The name "Naartje" is, however, becoming fairly well known now, as the Natal people have been sending several thousand boxes, and have advertised their fruit under that name. Then again our Cape naartjes are better and finer looking fruit than the smaller varieties known here as Tangerines. He recommends that the name "Naartje" should be adopted. It is the opinion of some of the dealers in citrus fruits that there is no necessity for packing in wood wool at all, and Mr. Chiappini is inclined to agree with them. He would, therefore, like some farmers to make an experiment by sending over a few cases of naartjes and oranges, packed tightly, each in tissue paper, without wood wool, they will then find that the boxes will take more fruit.

Raisins for Export.

Mr. Chiappini, the Trades Commissioner in London, writes:—In accordance with your advice, dated the 10th July, I received twelve samples of raisins packed in 2 lb. boxes. The samples were neatly put up, and served their purpose, except that they were insufficiently marked, that is to say, only six boxes contained names of three growers, each having two samples, the names being contained on loose slips of paper put inside the boxes. The other six boxes were blank. I personally submitted these samples to Messrs. C. and E. Morton, of Leadenhall Street, and Messrs. Hanson, Son and Barter, of Eastcheap. They independently agreed upon the following main points, viz.: (1) That the sample of Mr. J. C. Deetlefs was the best, and that the other samples were in a more or less degree inferior, but there was not much difference. (2) The raisins were fairly well graded, and the colour satisfactory. They prefer seeing them of a bright transparent, light

colour. (3) They strongly commented upon the presence of stalks. Upon closely examining the samples I should not have thought that this objection would have been raised, as the proportion of stalks was not much in excess of the Australian samples, which were declared to be of a little better texture than the Cape. (4) The best samples of Cape Raisins are valued at present at 30s. per cwt., duty paid, that is to say, from this should be deducted: (*a*) Railage, Goudini to Table Bay; (*b*) Dock dues and charges; (*c*) freight to London; (*d*) London warehouse and landing charges, about 2s. cwt.; (*e*) Duty 7s. per cwt. The other samples would be worth about 27s. to 28s. per cwt. at present.

Australian raisins of a similar class, but of a little better quality, are making from 33s. to 35s. per cwt. Valencia's are making from 29s. to 31s. per cwt. I must here mention that the price of raisins is now very high, but it is anticipated that there will be a fall of from 2s. to 3s. 6d .per cwt. It is expected that there will be little or no difference in the prices during April, May and June of next year, but this depends upon the Valencia output, which will be ascertained during the months of November and December. By that time, I can, therefore, advise Cape growers fairly well as to what the prices will be during their following season. The raisins must be packed in 28-lb. boxes, size 20 x 7½ by 7 inches outside measurement. They must be very tightly packed and, if possible, all the stalks should be removed. Sultanas must be packed in the same sized boxes, and are now worth about 47s. per cwt. duty and charges same as for raisins. Currants are now 23s. 6d. per cwt. to 31s. per cwt. for medium and good qualities duty paid, to be packed in 40-lb. boxes, duty 2s. per cwt. In shipping raisins for sale they should be consigned to commission agents, or in cases of trial shipments, they may be sent to the Trades Commissioner. It is not the custom in the trade to buy on samples. The whole shipment must be in the docks and opened for inspection if necessary, when the broker effects a sale.

Cape Prunes in Europe.

The Trades Commissioner, writing from London recently, says:—There is a very wide market for plums in England, but dried fruit of all sorts are more generally used on the Continent of Europe, though the English market to a great extent supplies the Continent with such portions of the fruit as are imported from the British Colonies. The plums should be neatly packed in boxes, size 15 inches by 9½ inches by 6 inches, weight 25 lbs. net. The boxes should be packed upside down, that is, with the lid downwards, the first few layers being neatly laid down and the others as well arranged as practicable. Then the bottom lid is nailed on last. This practice does not, however, seem to be followed by all shippers, who seem to pack the boxes in the ordinary way. Neat white paper should be used for lining the boxes, and a neat piece of lace paper placed around the top. The fruit should be graded in accordance with its size; dealers are very particular about this. The sizes are recognised as to the quantity of fruit to the pound, and should be graded in limits of tens, that is 40/50—50/60, 60/70, and so on, the largest size fruit making the best price. The wholesale dealers are now quoting for Californian plums as follows: 30/40 at 46s. per cwt., 50/60 at 41s. per cwt., 60/70 at 36s. per cwt., duty paid. Contracts are at present being made for the new fruit arriving in October next at an advance of 5s. on the above prices. French plums, which are packed in 28-lb. boxes, are selling at much higher prices.

Quality and Comparison.—I have already been placed in possession of several samples of Cape plums during the past month, which were submitted by me personally to several dealers and brokers. It is not necessary for me to deal with all the separate samples, upon which I reported direct to the persons who forwarded them, and I shall now only deal with the samples received by last mail from the Prune-growers' Association. Accompanied by a gentleman in the trade from the Cape, I showed these samples to some of the dealers, their concentrated opinion was as follows:—

No. 1 Sample.—Size good. Quality of fruit good. Colour too light. Condition bad, that is to say, the fruit was badly prepared. The moment the box was open it was noticed that the fruit was in a state of fermentation. It was not dried or evaporated sufficiently, it was too soft or immature. A gentleman in the trade stated that fruit from other parts which he showed us and which was in a much better condition, was dried and fired before packing, and again fired when in the box. The grade of the sample was marked 50/70. This grading is too wide, and is, therefore, not acceptable on the market. They should be graded as above stated—50/60, 60/70.

No. 2 Sample.—The above remarks apply to this sample as well, which was of course of a similar size. These samples, in consequence of their bad condition, I could not get a firm price offered. The dealers were reluctant to offer a firm price for these. Generally, the Cape prunes do not compare favourably with those from other parts, but the defect is due to the indifferent manner in which they were prepared. I have no doubt that this difficulty will speedily be overcome.

Cape Dried Fruits at the Exhibition—Judges' Report.

It is a matter for regret that, having regard to the excellent specimens of this branch of industry which are to be found at the Exhibition, the number of exhibits should be so few. The samples shown do not admit of criticism from a standpoint of quality, nor does the system which has been adopted in the process of drying or evaporation. To deal with the exhibits in the order of merit, the palm for the best show of dried fruits must be given to Cape Colony. The exhibit of Evaporated Apricots, by Rhodes' Fruit Farm, of Groot Drakenstein, is the best of that section, and is some of the finest fruit which has been seen in this country, and is a grade so high that it is not often obtainable on the London market. There are absolutely no defects whatever in the way this fruit has been preserved. The colour is exactly what is generally regarded by the London trade as the most to be desired, viz., a dark reddish-yellow, and here it may be as well to say that the exceedingly pale yellow colour which can be obtained by bleaching the fruit with sulphurous acid fumes is not by any means an advantage from a marketable standpoint, and if, as is usually the case with fruit treated in this way, the flavour is in any way affected, such treatment is decidedly disadvantageous. The general get-up and style of package, however, is not so blameless as the quality, and is capable of some improvements. The Californian growers have adopted a process of curing with a view to increasing the weight, the difference being simply that the Californian fruit is (after having been sun-dried) dipped by some packers into a solution of glycerine, some preservative acid and water. The fruit is not allowed to absorb a large percentage of the liquid, but sufficient to make

it softer in condition than fruit, which is only sun-dried, and is preferred by the British public because it does not require soaking for so long a time before cooking. It remains for the South African grower to decide whether he will ship his fruit in the purer sun-dried state, like the Australian, or to follow the lead of the American, and supply the public with an article for which there is already a demand. In any case he will do well to adopt the American method of packing the fruit into boxes which have been neatly made and well planed by machinery, and usually contain either 25 lbs. or 28 lbs. net each. The fruit should be nicely faced with selected fruit, which is easily accomplised by packing the boxes upside down, and at the same time lace paper should be put round the edges of the boxes, improving the appearance for grocery window show purposes. The price usually realised here for the class of fruit exhibited by the Rhodes Fruit Farm is about 7d. per lb. under bond, but owing to the failure of the American crop last year, the price would be considerably higher if a consignment could reach this market within the next month or so.

The Apricots are good in quality, and the flavour is also excellent, but they have not been carefully handled in packing. There is a mixture of both large and small fruit, which should be avoided, and also a mixture of light and dark coloured fruit, which is undesirable. The small fruit should be picked out and packed alone, and the large fruit packed separately. The expense of this selection will be repaid by the enhanced figure which the larger fruit will realise, and the small fruit of even size will also realise a better price than the mixed sizes. This sample, taken as it stands, would fetch 5d. to 5½d. under bond here. Apricots are usually graded into four qualities, known to the trade as "Choice," which is the smallest fruit; "Extra Choice," the medium size fruit; "Fancy," bold fruit; and "Extra Fancy," the largest size of selected fruit.

The flavour of the Raisins exhibited by Mr. Mulder, of Oudtshoorn, in the Cape Colony, is indeed fine, and the texture is also very good, but the fruit is somewhat lacking in size, although there are some fine bold Raisins present. As in the case of one lot of Apricots, this fruit would be considerably enhanced in value if more care was displayed in the process of packing. In the first place the Raisins should be graded into three sizes, and the different grades packed separately. The boxes should be faced and edged with lace paper in a similar manner to that described for Apricots, and should contain about 14 lbs. net each. The principal object for the grower to aim at is size, paleness and evenness of colour, but when size cannot be obtained, a good solid medium-sized meaty Raisin is always saleable. The grade of Raisin, as exhibited, would realise from 3½d. to 4½d. per lb. under bond in London.

Export of Angora Goats.

As a Proclamation has been promulgated by His Excellency the High Commissioner, providing for the imposition of a duty, equivalent to that imposed by Section 1 of Act No. 21 of 1899, on the export of Angora Goats from Basutoland, except to such South African States and Colonies as impose a similar duty, exportation of Angora Goats from this Colony to Basutoland will, from and after the 1st October, 1907, be *ipso facto* exempt from payment of the export duty imposed by the Act above cited.

Seed Distribution.

With reference to the announcement in the last issue, dealing with the gratis distribution of seeds, we have been requested to state that Agricultural Societies are not included in this privilege. The seed will be distributed through Farmers' and Fruit Growers' Associations only.

Progressive Farming.

"A.Z." writes from Griqualand East:—A good deal is heard about "Progressive Farming," but very little has been done to show in what this consists. There seems to be a tendency to insist on details without giving due consideration to the solid underlying principles. Possibly the best definition of "Progressive Farming" would be, that it is the style of farming which gets the best returns with the smallest expense, and when we say this, it must be understood that the smallest expense means also the smallest possible draft on capital, the capital being the natural fertility of the soil. Many people appear to think that progress is a matter of machinery, but this is not necessarily the case. One sees a man with capital start to buy most of the machinery that has been invented, but when that man allots one piece of land to his mealies, another to his cereals, and goes on growing mealies and cereals on the same plots year after year, it may be doubted whether he is truly progressive. Another man gets his reputation by planting large plantations, in itself a most praiseworthy thing. If, however, he neglects his farm outside the plantations, allowing sluits to form unchecked, and the natural timber to die out for want of care, then he, too, has not fairly grasped the principles of progressive farming. Others pride themselves on their well-bred stock, yet trek in the winter, which is surely rather retrogressive farming. The point that is not sufficiently insisted upon is that a poor man may be just as progressive as a rich one. Money is not an essential condition of progressive farming, though it may be a consequence of it. Provided a man rotates his crops, stops sluits, cares for natural growth, and manures as he can afford, it matters little whether he reaps with a machine or a sickle, threshes with a steam-engine or a flail. Those things are mere details of management, which the individual farmer must settle for himself; they do not interfere with the principle of the thing. The *Agricultural Journal* might conceivably do a little more than it does towards helping men to the use of progressive methods. The *Journal* has never, for instance, published a scheme of rotation of crops, yet such schemes must have formed part of the experiments at Stellenbosch, whilst any European handbook on agriculture would give several. We also hear much about the evil effects of veld burning, but no remedies are suggested. The evil may be admitted, but, seeing that burning is at present a *necessity*, could not suggestions be made to mitigate the damage thereby caused? I trust that this letter may arouse some interest in these questions.

Sheep Dip Depots Abolished.

The abolition of all the Depôts established throughout the Colony for the sale of Sheep Dip, in terms of Section 11 of the Scab Act No. 20 of 1894, such abolition to take effect from the 30th ult., is announced in a recent *Gazette*.

Farmers and the Wool Trade.

The President of the Highland Wool Growers' Association, Mr. T. T. Hoole, of Atherstone, in his last annual address to that body, drew attention to the initial troubles which face co-operative enterprise in the sale of

wool. He said:—Difficulties and prejudices have had to be contended with, and the whole scheme of co-operation has had to fight against certain vested interests, and old-fashioned customs, which have not always been in the interest of the farmer, nor have they tended towards improved methods of production. Without going into details, I would like to state that this Association, when first formed, entirely favoured local sales by public auction, and although some of the members were not satisfied with the result of the first experiment, all recognise that local sales have many advantages and would favour a repetition of the trial, if it were thought that the result would meet with the support and the encouragement it deserves.

The Highlands Wool Growers' Association is affiliated to the National Wool Growers' Association, and every effort has been made by that body to induce farmers to adopt improved methods, and the advantages of shearing on clean floors, intelligent sorting and packing, and marking their bales with a true description of the contents, have been pointed out, and Mr. Hoole feels satisfied are having good results. His contention is that the farmer is to blame for the low price of South African produce—do away with kraaling and scab, and our best wools will compare favourably with any in the world, both as regards quality and price.

The Prospects of Cotton Growing.

In view of the much discussed possibility of cotton growing in Cape Colony, and the large number of experiments now being carried on, the following report of the Judges at the recent South African Products Exhibition in London will be of interest. The first sample was grown by Messrs. Fincham Bros., The Grange, Herbert, the second by Mr. Evelyn, at Port Elizabeth, to both of whom medals were awarded. The values placed on the samples are very satisfactory indeed, and much above the average price of cotton.

We consider the value and description of your cotton samples grown in Cape Colony for London Exhibition to be this day as follows:—

Mark.	Value.	Classification.
No. 1.A.	about 12d.	Apparently Afiffi and Egyptian mixed; irregular in colour, staple strong, rather irregular in length; good result.
No. 2.B.	13d. and 14d.	Sea Island character; staple long and moderately strong, rather coarse.

(Sgd.) Wolstenholme & Holland.

FARM AND VELD.

Destructive Leaf-eating Beetle.

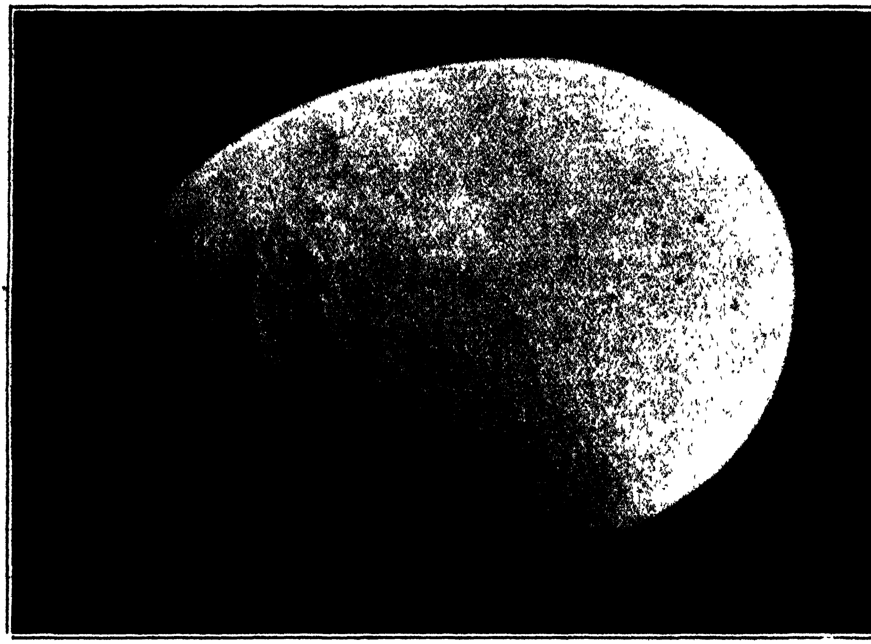
Mr. P. De Waal (D. son) writes to the Government Entomologist from Calvinia:—"I am touring these parts at present, and had occasion to visit some farms growing quite a number of fruit trees, in which I noticed a most destructive insect destroying the fruit flowers and young leaves as they run out. I find this insect so destructive, and it appears to me of such a most serious character that I am obliged, being interested in the fruit line, to draw your most earnest attention to this novel development. It practically destroys all the flowers of the trees first, and now preys on the young foliage. The fruit varieties suffering at present in this neighbourhood are peach, apricot and quinces. The peach and apricot crops are simply gone, and the foliage is being done away with now. From what I can gather the insect was observed since last year for the first time, but this season it simply plays havoc with the fruit varieties named, especially peach and apricot. I don't think I will succeed in explaining the insect and its mode of operation properly, so I am forwarding you by this post a parcel containing some of the insects. I shall be very glad if the matter could be taken up through the *Agricultural Journal* for general information. Should this pest find its way south (at least I am not aware of its existence in the Stellenbosch district), it may perhaps prove a dangerous addition to what we have to combat already. I am told the insects fly from tree to tree when it gets warm in the day."

The insect is a leaf-eating beetle, and has been determined by Dr. Peringuey, of the South African Museum, as *Megalognatha bohemani*, Baly. This is the first time it has been brought to the notice of this office, but certain related species, more especially *Malocosoma inconspicua*, Pering., which is a serious pest of fruit trees in the Bathurst district, have received considerable attention. In this case arsenate of lead, applied at the strength of one pound of the poison to twenty-five gallons of water, was found to be a reliable remedy. The spraying should be carried out as soon as the first beetles are noticed in the spring, or even earlier in the orchards where the pest occurs regularly. Fortunately this poison can be applied at almost any strength, in the case of most fruit trees, without risk or injury to the foliage, and in the case of other than stone fruits it would be advisable with the new pest to apply it even stronger than recommended above, say, using three pounds of the poison to fifty gallons of water. Under certain conditions some stone fruits, especially peach and plum, have shewn injury after the application of arsenate of lead, but if the pest is very bad it would be as well to risk this injury in order to destroy the beetles.—R. JACK, Assistant Entomologist.

A Monster Egg.

Mr. G. J. H. Schurr, of Marchwood, Sunninghill Road, Wynberg, brought to this office during last month a monster fowl's egg, a photograph of which we reproduce herewith, life size. This egg, which was weighed and

measured in this office, turned the scale at 177·7 grammes, or a fraction over 6¼ ozs. avoirdupois. The dimensions were about 3½ inches long, with a circumference that way of 9 inches, while the width was 2¼ inches, with a circumference that way of 7½ inches at the widest part. The egg was laid on



the 13th ult. by a White Leghorn hen of a good laying strain. She is about 20 months old, and is in her second season. The egg appeared to have two yolks, but on being accidentally broken it was found to contain only one. This is the largest hen's egg that has come to our personal knowledge. Perhaps some of our readers may be able to give some information as to whether it is or is not a record for size and weight.

Woolled Persians.

An esteemed correspondent draws our attention to certain points in connection with the Woolled Persian sheep, described recently in the *Agricultural Journal,* on Mr. M. H. Gadd's farm at Tafelberg. To begin with, he says it was never advocated to breed them on veld which carries the Merinos proper, but there are countless miles of country, away from the coast, where to-day the Merino does not thrive, and where the black-headed hairy Persian and its crosses are largely farmed. This is the class of sheep which should be replaced by the infinitely more valuable type of Persian, viz., the Woolled one. The question of their immunity to heart-water is still uncertain, and the sheep hitherto procured and imported have been considered too valuable to experiment with further. It is hoped, however, to test the matter fully from the next shipment, due here during October. As regards the purposes for which the wool is used, I may mention that it is in very great demand, both on the European and American markets, for hosiery, jersey, carpet and similar manufactures, and is worth up to 10½d. per lb., and over in special cases, for this purpose.

As a butcher animal, there is no question as to which type, the hairy black-headed or the woolled one, presents the best and most promising make and shape. Continuing, our correspondent says: Everyone who procured sheep from the first lot has been more than pleased with the results, ordering further sheep from the coming batch. The progeny have grown out wonderfully, and I have seen some remarkably good samples of wool from the results of crossing with half and threequarter bred black-headed Persian Merino ewes. The wool from these lambs was valued by local wool buyers at 8d. to 8½d., and one Bradford expert, who had handled large quantities of the Persian wool at Home, told me that in one instance at least the wool would fetch 10d. and over in the Bradford market. That the sheep are hardy, prolific and drought resistent, we know, also that they mature wonderfully early, and I must say that I believe they are likely to prove one of the most valuable breeds of stock introduced into this country when all points are considered. Naturally one cannot expect to find that nomadic tribes are likely to breed to "points" in their sheep, nor bring wool production to a fine art, as enlightened farmers do, therefore I am convinced that, with careful and enlightened attention paid to the breed, South Africa should produce a Persian wool not only equal, but superior, to that exported from Persia itself.

Gluyas Early Wheat.

Gluyas wheat, sown experimentally with very promising success last year, has been more extensively tried this season, and is doing remarkably well. It has thriven in the very dry season which has visited the grain growing parts of the Western Province this year, and a crop at Hermon is so far forward that it was ripe for harvest during the month of September, a unique occurrence probably without precedent in the Colony.—E.A.N.

Reaping Attachments to Mowing Machines.

Mr. C. Stuart, of Sunday's River, writes:—"Jay" makes inquiries as regards reaping attachments. May I, provided you think it necessary, supplement Dr. Nobbs' remarks. A neighbour of mine has used the reaping attachment of a Blackstone mower, and found it very satisfactory. I fixed one up for myself on an old Osborne mower, and it worked splendidly. It was not practical to cut straight through the day with a full team of binders. Rather cut for a couple of hours in the afternoon, with a couple of boys following the machine laying aside the sheaves as raked off the trailer, and bind next morning in the dew. The machine cuts a lot of dubbeltje and makes the binding slow and painful. A smart boy had better walk beside the machine in the standing crop, and with a reed lay back the corn in front of the knife. Let the operator lay in a stock of span teeth for his rake. Several are cut off every round before he will have learnt the knack. The cost of a weedy crop, short and on rough ground, is about 2s. 6d. per 100 bundles.

Arsenate of Lead.

It has taken but one season for this new insecticide to displace Paris green as the popular remedy for the Codling Moth and Pear Slug in this Colony. The ready prepared article was offered last year for the first time at a price which fruit growers felt they could afford to pay for it, and the efforts of the Government Entomologist and his assistants to get it taken up resulted in a sale of about ten tons. Nearly all imported last year was

of one brand, "Swift's," but in consequence of the demand created and the number of firms who wish to cater for the trade, it is anticipated that a number of other brands will be placed on sale for the season now opening. Some of these may be of inferior quality, and to minimise the risk of disappointment and injury to trees, a few words of caution seem desirable. To begin with, the value of arsenate of lead as an insecticide depends not only on its chemical purity, but very largely on its being prepared in such a way that it will be flocculent when mixed with water, and will settle only very slowly and uniformly. These properties involve that it will adhere well to the foliage. Experienced manufacturers have found it impracticable to dry their product to the condition of powder and have it retain these characteristics satisfactorily, and they therefore supply it in paste form. The paste is, ordinarily, half water and half arsenate. When kept in wooden containers it tends to lose moisture, and consequently a farmer who chances to get somewhat old stock may be misled into thinking that he is getting short weight when his purchase is full quantity and perfectly good so long as it is not too dry to mix readily with water. Even when quite dried out such an arsenate makes a better spray mixture than would be made from a powder dried by the methods which a manufacturer would be likely to use.

Practically all the arsenate of lead on the market is made in America; but as most supplies brought into this country are ordered through English houses it is quite likely that some orders for arsenate will be sent to British chemists, and that these, not knowing the peculiarities in the preparation necessary for spraying purposes, will specially prepare and supply a powder and not a paste product. Two or three such powders have already come to this country. But while powder preparations should be avoided, it is not safe to rely on all the paste preparations that may be offered. The chief ingredient used in preparing arsenate of lead is arsenate of soda, a water-soluble chemical that is an extremely active plant poison; and unless arsenate of lead is carefully compounded it is apt to retain some of this soda ingredient, and consequently prove more or less injurious to trees. Some serious trouble has been experienced by American fruit growers with badly prepared arsenate of lead, and hence we must be on our guard. In some cases arsen*ite* of soda is said to have been used instead of arsen*ate* of soda, with resultant bad effects. For these reasons it is wise to restrict purchases to brands of high repute. Swift's is such a one, and "Disparene," made by the Bowker Chemical Company, is another. The latter is just as much arsenate of lead as the former, although it goes entirely under the name of Disparene. It had a small sale in the Colony last year, and is being imported in larger quantities for the present season. In America the writer was informed that at the same price there was little to choose between the two makes mentioned, sometimes one seeming a little the better physically and sometimes the other. Other brands which may be imported may be equally as good or even slightly better, but for the reasons given they should be tried cautiously.

Peach, plum, and other stone-fruit trees are liable to slight injury from arsenate of lead, especially in connection with foggy or rainy weather. In some cases considerable scorching of the fruit and foliage has resulted with the use of preparations which seemed excellent when judged by chemical analysis. The fault is one which the manufacturers, despite their best endeavours, have seemed unable to remedy. Ofttimes no injury at all is done, but it is well to avoid spraying stone fruit trees without special reason, and then, as a rule, not to use over one and one-half pounds

to fifty gallons of water. A Californian chemist has recently made the claim that he is able by a new process which he is patenting to produce an arsenate as good as the best against insects, whilst wholly harmless to foliage under any conditions of weather. The Department has the promise of a sample hundred-weight of his product for testing in the Colony.

Stock Influences in Citrus Culture.

A Port Elizabeth correspondent, writing to Mr. C. P. Lounsbury, the Government Entomologist, says:—"My object in writing is to obtain your opinion on the value of the conclusions arrived at by Mr. W. E. Masters in his article on stock influence and mongrelisation in citrus culture. I am interested with a friend in a citrus orchard numbering several hundred grafted and budded trees, and we had intended planting several hundreds more this year. In view, however, of the facts disclosed in Mr. Masters's article, we do not feel justified in going to this expense before obtaining a practical opinion on the important question of stock influence, and trust I am not presuming too much in asking for your valuable advice on this subject.

"The farm I am interested in is situate near the Swaziland Border on the Umbelusi River. The orchard is on the river bank, the ground is level, the soil dark loam, with clay seams and sandy strata mixed. Root rot made its appearance in the orchard last year, but so far only about a dozen trees are affected. Thirty or so trees were in bearing last season; some of the fruit was juicy, but flavour in all was wanting, and the majority were spongy and tasteless, thus showing strong stock influence. The trees were procured from Natal, either Maritzburg or Durban Botanic Gardens, I am not sure which. I have no fault to find with the trees; they all show splendid growth, except the few planted too deep, but I fear the fruit will not find a market for the reasons mentioned above. Last summer was an unusually wet one, which may have had a bad effect on the fruit, but some of the symptoms mentioned by Mr. Masters, such as malformation of the Washington navel, were noticeable, which inclines me to ascribe the effect to stock influence. Unfortunately, I have no data with me relative to the stocks on which these trees were grafted, but I have an idea they are on lemon stocks.

"From Mr. Masters's article I gather that the Seville is the only Root-rot resistant stock. That Pamplemous would thrive best in soil such as ours (we have a 6-inch centrifugal pump for irrigation); and that lemon, if not altogether useless, is absolutely unreliable. I understand Seville stocks have been discarded by most, if not all, nurserymen, and presuming this to be the case, the question I have to decide is whether to risk the root rot and try either the Pamplemous stock, the Cape seedling, or wait till something more definite is known about this subject. You will, no doubt, from personal observation and report be able to clear the doubt which now exists, owing to the contentions raised by Mr. Masters, and I hope you will not vote me too troublesome in soliciting your opinion."

The Case Discussed.

To this Mr. Lounsbury replied as follows:—I may say that I cannot give answer to your queries as a practical horticulturist, but only as an agricultural official who takes an intelligent interest in the stock problems

that perplex orange growers in South Africa, and who has sought expert opinion on Mr. Masters's system of propagation. Whilst in America on holiday leave during the past six months I gave some time and attention to these matters. This I was able to do through the kindness of our Government, I being given authority to travel and make enquiries pertinent to my official work at the public expense. I explained the principle of Masters's system to many prominent horticulturists and plant breeders, but not one could tell me of any experimental work in America or elsewhere bearing on the subject, nor say definitely whether or not the principle would prove fallacious. Most, however, were very sceptical of its value, and amongst them so excellent an authority on horticultural subjects as Professor L. H. Bailey. Others, including Dr. H. G. Webber, who is perhaps the most deeply scientific of American plant breeders, thought successful application quite conceivable and careful experimentation warranted. Among practical horticulturists I met Mr. G. L. Taber, of Glen St. Mary, Florida, to whom I was referred by the plant breeding experts of the United States Bureau of Plant Industry, who have the highest respect for his observations and opinions. Mr. Taber is a prominent nurseryman and, incidentally, orange grower, in Northern Florida. For a generation he has paid special attention to stock matters and the selection of improved varieties, and has conducted extensive experiments in such lines with scientific care. He has become well acquainted with many manifestations of stock influence in his long experience; but he has never yet encountered marked differences in vigour of growth and longevity which he thinks could be associated with the stock parent of the scions. If Mr. Masters's main contention is correct—that the affinity of a bud or graft for a stock often depends upon such bud or scion being of a strain which has been propagated successively and repeatedly upon that particular stock, Mr. Taber cannot understand why that fact has not forced itself on his attention, since the principle involved has certainly been time and again violated by him. He has employed the Seville stock (as Florida Sour) very widely, and the Washington Navel has been amongst the varieties which he had budded upon it.

Professor H. Harold Hume, known to many South Africans as the author of "*Citrus Fruits and their Culture*," is now manager in Mr. Taber's nursery business. He shares Mr. Taber's views, but less confidently asserts them, owing to his more limited experience, Mr. Taber being his senior by many years. Both gentlemen say that trees grow on the Sour (*i.e.*, Seville) stock practically as well as on the Sweet stock in Florida, except where the conditions are unfavourable for that stock. From what I told them of the behaviour of the Seville in South Africa they were of the opinion that our climatic and soil conditions or our treatment of citrous trees must be unsuitable to the Seville, whilst congenial to the Rough Lemon, and that consequently the common-sense thing for us to do is to give preference to the latter, even to the entire exclusion of the Seville. From Taber's place I went to Orlando, near the middle of the State, and here the local conditions clearly favour the Rough Lemon root, trees on it not uncommonly being half as large again as ones of the same age on the Sour. Yet the trees on Sour did not tend to die out as with us. As elsewhere in Florida, irrigation is not practised. In most parts the trees seem to have no difficulty in finding sufficient water for maximum growth on the Sour, but here appeared an exception. A most unusual drought prevailed last season, and I was told that whilst the trees on the Lemon in and about Orlando were not much injured, those on the Sour in most orchards lost a large part of their foliage. I visited half a dozen growers here, and all, without exception, favoured the Lemon as a stock above all others, and

they were not inclined to admit any inferiority in the resultant fruit. The soil and rainfall conditions in Florida are so dissimilar to those of the Cape that one naturally supposes that the variance in value of the Sour as a stock in the two countries must be in large part due to those differences. In general Florida soils are sandy and well drained. To grow orange trees they require frequent and heavy fertilizing, and artificial manures are used almost exclusively. One successful grower told me that he made six applications in the course of the year, varying the composition of the mixture with the stage in development of the fruit. The loss by leaching is too great to admit of all the year's supply being given at one time. Where the trees are not fed the foliage becomes scanty and dwarfed, and twigs die, and the general appearance is that of failing trees on Seville stock at the Cape. The rainfall averages about fifty inches in the orange growing parts. About one-half falls between June 1st and October 1st, that is in the four summer months, and it is unusual for much less than two inches to fall in any one month.

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California Experiences.

In California, chiefly near Pomona, I was shown a number of orchards, or rather parts of orchards, of Washington Navels on Sour roots. Very little difference in size or vigour between them and neighbouring trees of the same age and variety on Sweet stock was apparent. In one case there were several acres of trees seventeen years old, half on Sour and half on Sweet. They had been brought from Florida, and the owner was positive in regard to the stocks. They were all well grown and in perfect health. Those on Sweet were a trifle larger, but so slight was the difference that I would have overlooked it had not my special attention been drawn to it. The owner said the bearing was about equal, making allowance for the slightly larger size of those on Sweet. The soil was a loose, very stony loam, underlaid with white sand (according to the owner) four to six feet down, and I marvelled that such fine trees could have been grown in it. The explanation, probably, is liberal manuring, and judicious irrigation and cultivation. Each tree had received a dressing of 25 lbs. of mixed fertilizer a few months before. At the old University Experiment Station grounds, near Pomona, I was shown a row of six Washington Navels on Sour alongside one of six on Sweet. The trees had all been planted in 1891, and here again there was little perceptible difference in growth which could be ascribed to the stocks. The only conclusion I could draw was that the soil conditions suited the two kinds about equally; but I must confess that I came away from this and the other places unable to propound a satisfactory explanation for some of the failures of Sour stock that have occurred at the Cape. However, it now seems to me that South African growers should rest satisfied with the Rough Lemon as their chief stock until conclusive proof is forthcoming that some other stock possesses advantages over it under the conditions which rule in this country. It seems to me that the Seville for its best growth must require heavier feeding and a more uniform soil moisture than is necessary in the case of the Rough Lemon and Sweet seedlings. I may mention that citrous nursery stock, both in Florida and California, appeared to me to be more vigorous and better grown in every respect than the citrous stock of most of our Colonial nurseries. The result, if not the aim, in many of our nurseries seems to be to produce a tough, wiry tree that will survive drought, bad cultivation, and poor soil; and it may be that while the Lemon root is capable of withstanding such training and responding to better conditions afterwards, the Seville is not.

Stocks for South Africa.

Perhaps I have dwelt at rather unnecessary length on the relative behaviour of the Seville stock here and in America, but I have done it to show that I believe South African nurserymen quite right in re-adopting the Rough Lemon. This stock is practically unknown in California, but in Florida it is ranked next to the Sour (*i.e.*, Seville) as regards resistance to mal-di-goma and in the Colony we know it to be much hardier in this respect than Sweet orange. I do not think you will have cause to regret your action if you take your new trees on it. Sweet stock involves greater risk of mal-di-goma, and the reliability of the Pamplemousse as a stock for South Africa is open to question. The fruit on your trees which came into bearing last year should not be taken as representative of the character of fruit which the trees will produce when they come into full bearing. Young orange trees have a tendency to produce coarse, poor flavoured fruit, a tendency specially marked in trees on the Lemon in good soil. Professor Hume, in the work mentioned above, says in this regard: "After one or two seasons of fruiting have passed, this undesirable feature disappears and the fruit produced is equal in quantity of juice and thinness of rind to that borne on trees worked on any other stock." Moreover, it is likely that the flavour of your oranges last year was deleteriously affected by the excessive rains.

Mr. Masters's Theories.

I do not wish to infer that I am opposed to Mr. Masters's theories. As I have stated above, some high authorities acknowledge that there may be a basis of truth in his main contention—that affinity to a stock may be acquired by the successive working of a variety to that stock; that the stock has some influence on the shape and vigour of the top is recognised by other writers; and that it may have some effect on the size and flavour of the fruit has also been granted. But these problems are not of much practical interest to the South African who this year wishes to set out an orchard of orange trees. He wants trees that are reasonably sure to grow thriftily and withstand disease, and which will produce an abundance of marketable fruit. That an epicure may possibly be able to distinguish between an orange from a tree on Seville stock and one of the same variety from a tree in the same orchard on Lemon stock is not a matter which he should allow to disturb him, at least when there is room to doubt, which there is now, that his trees would prove profitable on Seville. Personally I would much like to see Mr. Masters's theories put to the test by a careful experimentalist, and I regret that there is no early prospect of this being done. However, he has supplied some parties with trees worked on his "training system," and in a few years these should bear evidence to the truth or fallacy of his main contention.

Gardening Notes—November.

Potatoes should be planted in vley ground, and where the land is damp enough. Crops of cabbage, cauliflower, beet and knol-khol may be put out. Turnips and lettuce may still be sown where they can be kept well watered. Late mealies should still be planted as well as cucumbers and marrows of the "cup and saucer" variety, these will produce their fruit later than the long or round sorts. Consecutive sowings and planting out of beet should take place. The young cauliflower beds must be weeded and thinned so as to get strong plants for putting out next month.

VACATION COURSES IN AGRICULTURE.

AT RHODES UNIVERSITY COLLEGE.

(*Continued from Page 316.*)

LECTURE No. II.

FARM ENGINEERING, DAM CONSTRUCTION AND IRRIGATION.

By W. INGHAM, A.M.I.C.E., M.I.M.E., Hydraulic Engineer, Port Elizabeth.

WATER.—GENERAL INFORMATION.

Air always contains a certain amount of moisture, but can only carry that moisture to a limited extent which is called the point of saturation, and this saturation point varies with the temperature and pressure. When air is cooled in passing over mountain ranges rain falls because at this lower temperature the capacity of air for carrying water is reduced beyond the limit of saturation. Of course, air does not always part with its moisture through this cause alone, for if this were so there would be no rain in level tracts of country.

Sometimes a cool current encounters a hot current of air, and causes the deposition of rain. Mountain ranges, however, play a large part in the formation of rain, and no doubt the Deserts of the Sahara, Central Asia and South America suffer by the absence of high mountain ranges. When rain falls some portion of it is re-evaporated, another portion is absorbed by the earth's crust and by plants, but the remainder in the ordinary course of events finds its way into the rivers and ultimately into the sea, whence it returns to the air in the form of vapour. In steam we find it in the form of a gas, in water as a liquid and in ice as a solid. It weighs 69,952 grains per gallon at a temperature of 62° F., or roughly 10 lbs. per gallon. To evaporate one pound of water at 212° F. into steam at 212° F. requires 966 British thermal units and one thermal unit is required to raise the temperature from 32° to 33° F. The thermal unit is founded on the heat required to raise one pound of water 1° F. and Joule fixed the equivalent of this heat at 772 ft. lbs. although 778 ft. lbs. are now considered more correct. This equivalent forms the connecting link between heat and work, and is now used as a basis for working out the efficiency of a steam

plant or other heat engine. At ordinary atmospheric pressure (14·7 lbs.) water evaporates into steam at 210° F. and the weight of the steam compared with air of the same temperature is as 0·625 to 1 while distilled water is 815 times heavier than air.

Water has its maximum density at 39·10° F. and freezes at 32° F. and is slightly elastic. One hundred parts of water at 32° F. expands to 104·29 when heated to 212° F. and to 110·16 at 314·28° F. The expansion of water when turned into ice is nearly one-eleventh, and this is the cause of pipes bursting during a frost, though the water only runs out when the ice is melted. If one pound of water at 174·56° F. is mixed with one pound of ice at 32° F. the latter in melting reduces the whole to 32° F., heat being liberated in the making of ice and absorbed in the melting.

One gallon of water weighs 10 lbs.; 277·274 cubic inches = 1 gallon; 0·16 cubic feet = 1 gallon; 62·3 lbs. = 1 cubic foot; 224 gallons = 1 ton; ·433 lbs. pressure = 1 foot head; 1 lb. pressure = 2·31 feet head. Water one inch in depth over an area of one acre = 22,622 gallons or 101¼ tons. A horse-power = 33,000 lbs. lifted 1 ft. high per minute. A good horse will lift 18,000 ft. lbs. per minute. An ox will lift 11,000 ft. lbs. per minute. A man will lift 2,500 ft. lbs. per minute.

Water required per head for cattle and horses, 10 gallons per day; pigs, 3 gallons per day; sheep, 1 gallon per day. Domestic purposes, in the country, from 8 to 15 gallons per day.

Rainfall.

Rain is measured by raingauges, and the most common sizes are 5 inches and 8 inches diameter. The rainfall generally increases in hilly districts with the height above sea-level, but not always. Prevailing winds in conjunction with high land affect the fall of rain considerably; for instance, at Port Elizabeth the annual fall is about 22 inches, while at the Port Elizabeth Waterworks, 30 miles away, the annual fall is 34 inches, and after the mountain ranges have been crossed the rainfall is reduced to 14 inches in the Kleinpoort and Aberdeen Districts.

The following table gives the approximate average yearly rainfall in the districts named:—

	Ins.		Ins.		Ins.
Cape Town	26	Uitenhage...	18	Dordrecht	33
Table Mountain ...	62	Grahamstown ...	29	Beaufort West ...	9
Caledon...	20	East London	28	Calvinia	7
Swellendam	33	Somerset East ...	22	Johannesburg ...	29
Mossel Bay...	16	King William's Tn.	25	Durban	35
Oudtshoorn	9	Cradock	17	Pietermaritzburg	38
Willowmore	11	Graaff-Reinet ...	16	Kroonstad	25
Knysna...	28	Colesberg	15	Umtata	24
Humansdorp	27	Middelburg	14	Bloemfontein	21
Port Elizabeth ...	22	Aliwal North... ...	25	Kimberley	18
Queenstown	23				

The variation in rainfall is well shewn on the Port Elizabeth Waterworks Catchment Area where 11 gauges have been fixed. The lowest reading being 31·4 inches at 1,012 feet above sea-level and 52·68 inches at 2,300 feet.

The greatest fall in Cape Colony during one day as far as the writer is aware, is 13·46 inches at Cape Town. There are certain relationships between the highest, average, and lowest yearly falls common to nearly all

countries; for instance, if the average rainfall is taken over a period of 35 years, which is termed a cycle, the following ratios hold:—

	Wettest year.	Average year.	Lowest year.
	151	100	60
or with an average rainfall of 34 inches we obtain...	51 inches	34 inches	20·4 inches

With a 35 year period the difference above or below the mean will be within 2 per cent. and with a 15 year period 5 per cent.

The greatest known rainfall in the world occurred in 1861 at Cherra Ponjee, in Assam, when no less than 805 inches, or 67½ feet, fell during the year and 366 inches or 30½ feet in one month.

Planting trees on a large scale on a Catchment Area affects the flow of the river considerably by reducing floods and giving a higher dry weather flow. The rainfall is only slightly increased, but the evaporation is reduced and the water enters the soil to a much greater depth.

Evaporation.

Evaporation takes place from a water surface when the temperature is above that of dew point, and condensation when it is below dew point. It is greatest with high temperatures and winds and also with a high barometer. For instance, the weekly evaporation at a temperature of 55·5° F. was 0·42 of an inch and at 89·2° F. was 3·92 inches.

In Cape Colony the evaporation varies from 40 to 74 inches per annum; the greatest daily evaporation at the Port Elizabeth Waterworks was ·51 of an inch, the greatest monthly 7·11 inches and the lowest monthly 1·10, while at the Molteno Reservoir, Cape Town, the greatest was 12·80 inches and the lowest ·50 of an inch. In the winter 6 months, the evaporation amounts to about 15 inches as compared with 33 in the summer 6 months, in the neighbourhood of Port Elizabeth. To shew the effect of evaporation on a large scale it may be mentioned that it is so great on the Dead Sea that although the River Jordan flows into it there is no flow out of it and the level of the lake stands 1·3 feet below the level of the Mediterranean Sea. Another instance of great evaporation is that of the Mediterranean Sea, for although some of the largest European rivers flow into it there is always a current flowing inwards from the Atlantic through the Straits of Gibraltar.

The following figures by Miller give the average evaporation in England for three years from different classes of soil and plants as compared with water.

	Evaporation per annum in inches.		Comparative Evaporation.
Water	17·02	less than water	100
Peat	13·62		80
Sand	14·03		83
Clay	13·58		80
Garden Mould	15·12		89
Garden Mould in shade	6·27		37
Long Grass	48·16	greater than water	283
Short Grass	23·50		138
Red Clover	33·44		314
White Clover	31·15		183

Run-off, Percolation, and Absorption.

The term run-off means that portion of rain which finds its way into the river. For instance, suppose there is a rainfall of, say, 1 inch with a 10 per cent. run-off and the catchment area is 20 square miles in extent, the quantity flowing down the stream will be obtained as follows:—An inch of rain per square mile is equal to nearly 14½ million gallons, and if we multiply this by 20 the total fall will be 290 million gallons, but as only 10 per cent of this flows off the area the run-off in the river will be 29 million gallons.

The following table gives the run-off from various catchment areas under different geological conditions:—

	Run-off. Percentage.	Geological Formation.	Remarks.
Thames	30	Chalk.	Permeable.
Lee	25·55	do.	do.
Rivington Pike... ...	77·68	Carboniferous Sandstone.	Impermeable
Mersey & Ribble . .	52·57	Carboniferous & Triassic	Part Permeable and Part Impermeable
Loch Katrine	79·09	Old Formations	Impermeable
Seine	33·00	Various	Permeable.
Torquay...	60·33	Granite	Impermeable
Cape Town	45 to 93	Table Mountain Series	do.
Pt. Elizabeth Waterworks	6·76 to 38·98	do. do.	do.

At Thebus the annual run-off has been given as 10 per cent. of the rainfall, but for some of the Karoo rivers, such as the Fish River, perhaps 5 per cent. would be nearer the mark. The yearly run-off varies from 5 per cent. to about 80 per cent., according to climatic and geological conditions—the lower percentage being as a rule for permeable strata, like chalk and new red sandstone, and the larger for impermeable strata, such as the Table Mountain Series.

The quantity of water absorbed by soils, sand, rocks, etc., varies considerably and is greater in winter than in summer. Some experiments have been carried out in England with soil, sand, earth and chalk, and the absorption is as follows:—

	Yearly Rainfall. Inches.	Percentage absorbed.
Soil	26	23 to 30
Sand	26	83
Earth	31	45
Chalk...	27	40

The following quantities of water are absorbed by different materials:

	Gallons absorbed per cubic foot.
Carboniferous Limestone	0·127
Carboniferous Sandstone	0·896
Conglomerate	0·410
Old Red Sandstone	0·156
New Red Sandstone	1·729
Trap Rock	0·218
Chalk	2·758
Great Oolite	1·435
Granite	0·300
Quartzite	0·167

	Gallons absorbed per cubic foot.
Garden Loam	1·08
Loam—Cultivated Field	2·56
Vegetable Earth	4·37
Peat	5·40
Loose Sand	2·15

Strength of Materials.

Timber.—The timber commonly used for farm work is red or white deal, and the strength varies according to its section and method of fixing. Take for instance a pitch pine plank 9 in. x 3 in. in section, 22 feet long, and suppose it is required to find what weight can be safely placed upon it in the centre when laid flat and supported at both ends as in crossing a stream.

The formula to use is: $W = \frac{b\,d^2\,S}{L}$. W. being breaking weight in tons; b, breadth in inches; d, depth in inches; L, Span in inches; S., a constant found by experiment. If one foot, at each end, is allowed to rest on the bank, the span will be 20 feet and the constant for pitch pine is 2·12.

Now substituting the dimensions in above formula $W = \frac{9 \times (3 \times 3) \times 2{\cdot}12}{240}$ $= 0{\cdot}71$ of a ton. Therefore the breaking weight would be 0·71 ton, but it will be advisable to divide this by 5 in actual practice owing to the fact that the timber may be knotty or unsound, thus the safe load will be 0·14 ton Since the strength of a plank varies directly as its width, but as the square of the depth it will be seen that the plank referred to above will carry a greater weight if placed on edge, thus: $\frac{3 \times (9 \times 9) \times 2{\cdot}12}{240} = 2{\cdot}13$ tons or three times as much as before for the same size of plank.

S in the above formula may be taken as follows for the different kinds of timber: Pitch Pine, 2·12; Oak, 1·64; Elm, 1·08; Ash, 2·37; Fir, 1·78.

Strength and Weight of Materials

	Tension, tons per sq. inch.	Compression, tons per sq. inch.
Cast Iron	7 to 10	40 to 65
Wrought Iron	20 to 25	18 to 22
Steel	26 to 32	20 to 25
Copper	15	
Brass	5 to 13	
Gun Metal	17 to 18	
Good Brickwork in Cement		14 tons per sq. foot.

		Tension, Pounds per sq. inch.
Cement	7 days	400
Do.	28 do.	600
Do.	12 months	800

	Compression
Concrete (5 to 1)	300 tons per sq. foot in 12 months.

Timber.	Tension, tons per sq. inch.
Fir	**2·6**
Oak	**4·0**
Pine	**1·6**
Elm	**4·4**
Ash	**4·3**

Weight of Materials.

Baltic Pine, 36 per cubic foot; Oregon Pine, 36 do.; Pitch Pine, 45 do.; Teak, 45 do.; Stinkwood (Light), 45 do., (Black), 62 do.; Sneezewood, 60⅝ do.; Jarrah, 63 do.; Ironwood, 63 do.; Cast Iron, 450 do.; Wrought Iron, 480 do.

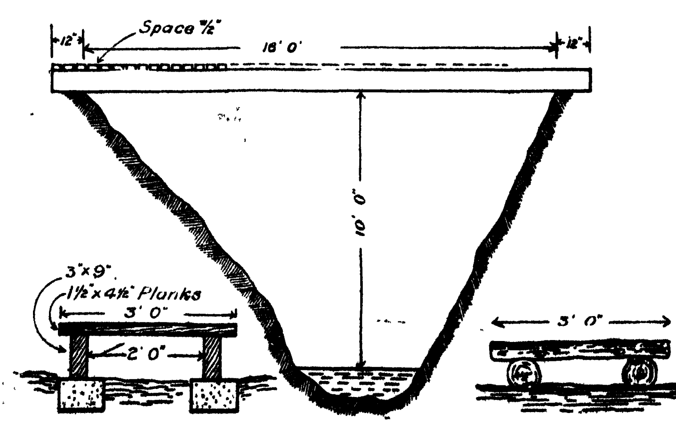
A round bar of iron can be broken or twisted off by a weight of 800 lbs. at the end of a lever one foot long and the strength of shafting varies as the cube of the diameter. A piece of oak or ash one inch square on supports one foot apart will break with a central weight of about 500 to 600 lbs.

Portland Cement.

Portland cement is usually specified to stand a tensile strength of from 400 to 500 lbs. per square inch at the end of 7 days. Samples for testing should be taken from every 10 barrels and well mixed together. The strength of cement increases from 30 to 40 per cent. during the first month, about 100 per cent. in 12 months and goes on gradually increasing in strength for several years. The principal chemical constituents of cement are: Lime, 62 per cent.; Silica, 24 do.; Alumina, 8 do.; Oxide of Iron, 3 do.; and the balance is composed of magnesia, water, carbonic acid, sulphuric acid, alkalies and insoluble residue. It weighs about 93 lbs. per cubic foot in the cask and has a specific gravity of from 3·10 to 3·15. The proportion of cement used for concrete in irrigation works is generally as follows:—1 Cement, 2 Sand, 5 Broken stone or gravel (1½ inch to 2 inch ring), and large stones can be embedded in the concrete to lower the cost. The stone and sand should be clean and have sharp arrises. The concrete may be laid in layers 18 inches thick and should be mixed with water to the extent of about 40 gallons per cubic yard. With stone, such as quartzite, weighing 167 lbs. per cubic foot, the concrete made in the above proportions will weigh about 146 lbs. per cubic foot. The strength of good 5 to 1 concrete should be about 300 tons per square foot in compression and 22 tons in tension when 12 months old. The cost of concrete made as above will be between 25s. and 40s. per cubic yard according to circumstances, with cement at 11s. 6d. per cask of 375 lbs. nett.

Small Bridges.

Sometimes it is necessary to cross a stream or deep hollow and to avoid trouble in flood time it is desirable to build a small bridge. For an ordinary footpath bridge two trees or two 9″ x 3″ planks can be laid parallel with one another and 4½″ x 1½″ battens nailed across as shewn below.



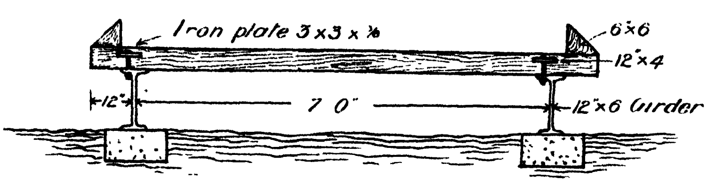
If a bridge is required for a bullock wagon, iron girders would be preferable. For instance, suppose a span of 20 feet is necessary and the weight of a bullock wagon, two bullocks and load is, say, 6 tons, the greatest strain will come on the bridge when the front or rear wheels are over the centre, and in this special case we may take the total weight as an evenly distributed load over the whole bridge, thus:—

	Tons.	Cwt.
Bullock wagon, two bullocks and load	6	0
Two girders, say 10 cwt. each	1	0
Timber decking, nails, etc., say	1	10
Total weight	8 tons	10 cwt.

As there are two girders, the weight on each girder will be 4 tons 5 cwts. Now if we take the depth of the girder as 1/20th of the span, a 12-inch girder will be required.

The formula for finding the strain in the flanges of an iron or steel girder with a distributed load is $S = \frac{W\,L}{8\,D}$. W = weight in tons, L = length in feet, D = depth in feet Substituting the figures we obtain $S = \frac{4\frac{1}{4} \times 20}{8 \times 1} =$ $10\frac{1}{2}$ tons. Now steel for rolled joists will stand 20 tons per square inch, but it is usual to allow for a factor of safety of 5, or a safe stress of 4 tons per square inch, so dividing $10\frac{1}{2}$ tons by 4 tons we obtain $2\frac{5}{8}$ square inches of metal required in each flange; so a rolled joist 12 inches deep, 6 inches wide, flanges half-an-inch thick and weighing 54 lbs. per foot will suffice.

The decking is made of 4-inch pitch pine planks kept in position by iron plates 3 inches wide and $\frac{3}{8}$-inch thick, bolted to the girders every 3 feet, and this will be found sufficient by the formula for strength of timber for 3 tons on a pair of wheels. The triangular guard rails at the sides of the bridge are for keeping the wagon on the decking, and are nailed to the 4-inch planks with 5-inch nails. A section of the bridge is shewn below.



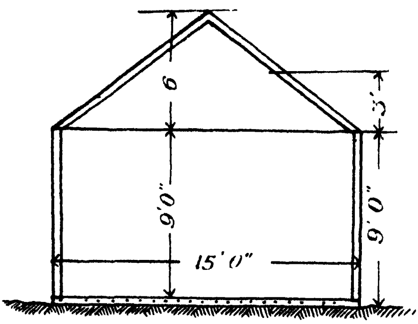
If it is more convenient to use timber, the iron joists can be replaced by two 10-inch by 10-inch pitch pine baulks.

Farm Buildings.

Buildings in the country districts may be classed as: (1) Brick or Stone with Galvanised Iron Roof; (2) Wood and Iron Buildings; (3) Wattle and Daub.

No. 1 is generally used for living rooms and Nos. 2 and 3 for out-buildings. It is not my intention to deal with the design of these buildings, but rather to give some idea of the cost when erected, so that a farmer may know what to expect when improvements or alterations are necessary. The cost of a brick or stone building with a galvanised iron roof in the country, where labour is cheap and first-class work is not required, may be taken at from $4\frac{1}{2}$d. to 6d. per cubic foot. Wood and iron buildings lined inside with ceiling boards will cost from 3d. to 4d. per cubic foot, and unlined

buildings about 2d. Wattle and daub buildings only cost from 1d. to 1½d. per cubic foot. The height in all cases is taken from the underside of the floor to a point half-way up the roof—thus an example of a wood and iron building lined inside and with a 4½-inch concrete floor will be dealt with. 4d. per cubic foot. Therefore the contents of the building is 12 x 16 x 30 The height will be $9 \div \frac{6}{2} = 12$ feet, width 16 feet, length 30 feet, cost, say, =5,760 cubic feet, which at 4d. per cubic foot works out at £96.



The cost of other buildings can be worked out in a similar manner. It is usual to insure farm buildings so as to avoid loss in case of fire, and the price will range from 7s. 6d. to 10s. per £100 for stone buildings with galvanised iron roof, to 25s. per £100 for wood and iron.

Fencing.

It is often desirable to fence in farm lands, and the most common form is a series of standards from 25 feet to 35 feet apart, with 5 to 7 wires, and a height of 50 inches to the top wire with straining posts every quarter mile. The fence may be made of either barbed or plain wire, with lacings from 3 feet to 6 feet apart. The standards can be of either sneezewood or iron, 6 feet to 7 feet long, and let into the ground 2 feet. The lower wires should be closer together than the upper ones, and in some cases the top wire only is barbed and the remainder plain. When ordering wire, the gauge must be stated and the sizes most commonly used are numbers 7, 8, 9 and 10.

Gauge Number.	7	8	9	10
Weight in lbs. per mile	442	348	282	223
Number of yards in 100 lbs.	467	566	700	882
Breaking strain of iron wire in lbs.... ...	1270	1050	890	740
Breaking strain of steel wire in lbs. ...	2912	2492	2044	1850

The cost per mile of a 5-wire fence with 150 poles per mile and lacings 5 feet apart will be as follows: —

	£	s.	d.
150 Sneezewood poles, at 1s. 9d. each	13	2	6
5 wires, No. 8, at 12s. per 100 lbs., say 16 coils	9	12	0
Fixing, at 1s. per pole	7	10	0
Lacings, 1,056 per mile, at 5s. per 100	2	12	9
Transport, Railage, Bracings, Straining Pillars, etc., say	5	0	0
	£37	17	3

Barbed wire is made in two-ply ordinary, or two-ply thick set, and would add about 10 per cent. on to the above cost. If iron standards are used the cost will be about £42 per mile of fence. On stock farms, where jackal-proof fencing is required, the cost per mile will be £65, with 170 iron standards and five straining posts per mile.

The price of gates may be taken as follows:—

Width in feet.	Roberts' Tubular Iron Gates. £ s. d.	Timber Gates. £ s. d.
10	2 15 0	2 12 6
12	3 0 0	2 17 6
14	3 10 0	3 7 6
16	3 17 6	3 12 6
18	5 0 0	4 5 0

The above prices work out at about 5s. per foot.

TELEPHONES.

Where a farm is situated within a few miles of a large town, it is sometimes a great convenience to be in communication by telephone. The total cost, with metallic circuits, that is, two lines of wires, including material, labour and transport, will be between £60 and £75 per mile, while the cost of material alone may be put down at £40 per mile, and the annual cost of maintenance at £2 10s. per mile. The iron poles are composed of two parts, a cast iron base and a steel tube, the latter being fixed into the socket of the cast iron base. The length of the poles from base to top is about 21 feet, and the usual distance apart is 88 yards, or 20 per mile. A lightning conductor is fixed on the top of each pole, and double insulators are required for the metallic circuit. The wire, which is of copper, is of 14 S.W.G., and is sold in coils of 112 lbs., which cost £3 15s. each. Call instruments of the best type cost £5 5s. each. Quite recently a telephone line about 14 miles long has been erected between Grahamstown and the farm of Mr. A. Douglass.

LIGHT RAILWAYS.

The construction of light portable railways for large farms is becoming more common, so perhaps a little information on this subject will be of use.

The gauge usually adopted is 2 feet—that is, the width between the rails is 2 feet, and the weight of a single rail is 12 lbs. per yard. The rails are generally 15 feet in length, and the weight of a section composed of two rails and six iron sleepers, all bolted together, is 150 lbs., and can be easily carried by two boys. With railways of this type, which are not, of course, adapted for high speed trains, the gradients may be as steep as 1 in 50, with a minimum radius of 30 feet for the curves. The cost of the 12 lb. rails, sleepers, fish-plates, and bolts will be about £200 per mile complete at any port in Cape Colony. The cost of laying in ordinary flat country will run about £30 per mile, and in rough country, with heavy cuttings and a few small trestle bridges, from £300 to £400 per mile. Points and crossings cost about £7 10s. per set, and 18 cubic feet wagons £10 to £12. A 12 horse-power petrol motor for working the line would cost about £350, or, on the other hand, it could be worked by horses, mules or oxen. The maximum gradient on which a locomotive will work by adhesion is 1 in 25, and if the gradients are steeper than 1 in 25 rack railways or haulage by cables are necessary. If larger rails than those mentioned above are re-

quired, the price will be about £6 per ton up to 35 lbs. per yard, with a gradually declining price for the heavier sections.

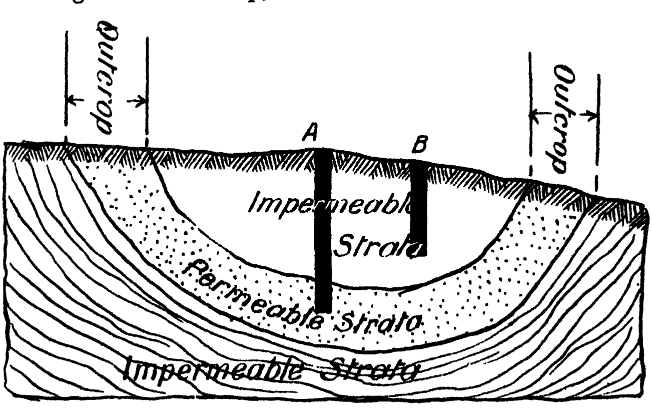
For main line work in fairly easy country the cost per mile will be roughly as follows: —

2 ft. 6 in. gauge, 35 lb. rails, £2,000 per mile.
2 ft. 6in. gauge, 25 lb. rails, £1,200 to £1,500 per mile.
2 ft. gauge, 25 lb. rails, £1,000 to £1,300 per mile.

as compared with the Decunville system, for farm or plantation work, of from £230 to £600 per mile, according to the nature of the country.

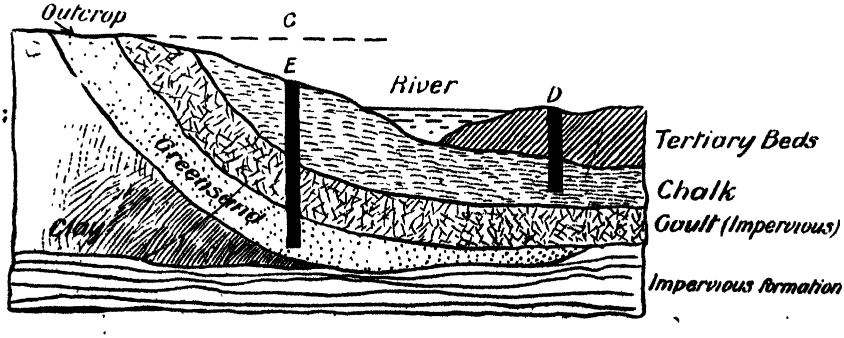
Well Sinking and Boring.

The location of underground water requires a good knowledge of geology and hydraulics. A well, or bore, sunk in any permeable strata, such as new Red Sandstone, Chalk, Gravel, Sand Beds, or some of the Oolites and Carboniferous Sandstones, will yield a good supply of water, but it is very risky sinking a bore in such rocks as quartzite, granite, and basalt, as they are too impervious, and the beds and joints are generally filled with a watertight material. In the Karoo beds the blue dwyka is said to give more water than the grey dwyka. Artesian bores are those where the water rises naturally above the surface, although farmers often give the name artesian to ordinary bore holes. A bore sunk into permeable beds overlaid with an impervious material will yield water according to the amount of rain percolating at the outcrop, as shown in sketch.

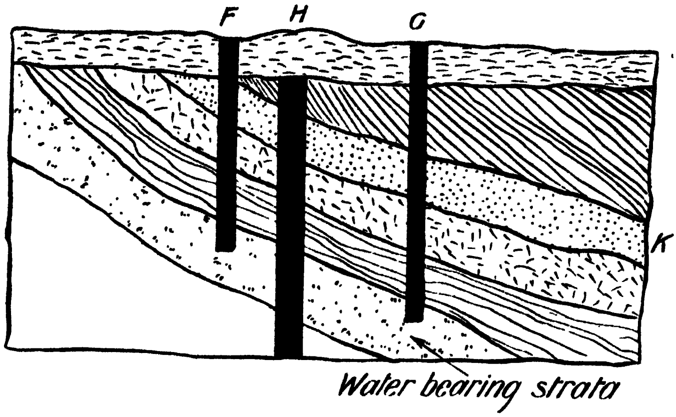


If a well is sunk at A, water will be obtained and rise to or near the surface of the ground, but the bore B will be dry.

The following example shews a true artesian bore E sunk to the greensand, and the water will rise to the level C. A second well sunk at D would probably yield water, but would not rise to the surface.



Another example with a dyke is shewn below.



In this case bores are sunk at F and G into water-bearing strata, but owing to an impervious dyke H, G will not yield a good supply, although F will; this is because the dyke H cuts off the water from the strata towards K. The lecture is too short to deal with the different methods employed in boring, but a few particulars as to cost will no doubt be found useful. In ordinary sandstones and chalk the following may be taken as approximate prices:—

Size of Bore.	Per foot. 1st 100 feet.	Per foot. 2nd 100 feet.	Per foot. 3rd 100 feet.
3	7s.	10s.	14s.
4	7s. 6d.	11s.	15s. 6d.
5	8s. 6d	12s. 6d.	17s.
6	11s.	14s.	18s
8	14s.	17s.	21s.

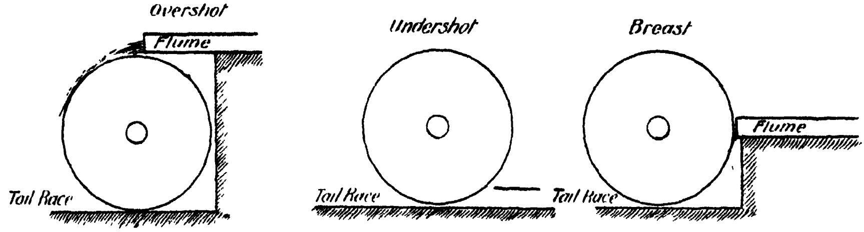
The price increases as the depth increases, and no allowance is made in the above for lining. The cost of steel pipes is given in another section, and the labour in driving the pipes for lining the bore must be added. In sinking wells 5 ft. to 6 ft. diameter the cost, without pumping, will range from 20s. per foot, for unlined wells, to 50s. per foot in clay with a 9 inch lining of brickwork in cement. For sinking a 6 inch bore through shale the contract price for the first 150 feet was 20s. per foot, with an additional 10s. per foot for lining and 25s. for the shoe. The cost of sinking a 2 inch bore, 1,328 feet deep, with a diamond drill, in quartzite, cost 28s. 6d. per foot. The Cape Government Engineer (Mr. Ritso), in his report for 1903, says that 75 per cent. of the bores in Cape Colony have been successful.

The average cost per bore worked out at £50, based on 2,000 holes sunk from 10 to 800 feet deep, and the cost per foot varied from 4s. to 80s. Mr. David Featherstone, of Klipplaat, has sunk several wells and bores, varying from 20 feet to 103 feet deep, in the grey and blue dwyka conglomerate, and the cost per foot averaged 25s.

In 1904 the Cape Government sunk 654 bores, with a total depth of 52,940 feet, or an average of 80 feet each, and they yielded about 7¼ million gallons per day. Out of the above total 192, or about 30 per cent., were unsuccessful. The average supply from the remainder of the bores would, therefore, be about 16,000 gallons per day. There are very few farms in the Karoo which could not be improved by boring, and it is surprising what a large amount of sinking can be done for £300 or £400.

Waterwheels and Turbines.

There are several kinds of waterwheels, and they are known as overshot, undershot, and low or high breast wheels, according to the method of applying the water.

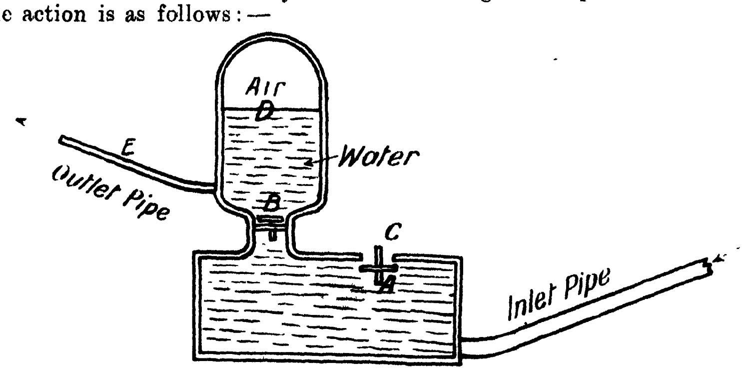


Taking the theoretical power from a fall at 100, the efficiency of the various wheels are:—Overshot, 65 per cent.; Breast, 50 to 60 per cent.; Undershot, 35 per cent.; Turbines, 70 to 85 per cent. Turbines are now displacing waterwheels, owing to their higher efficiency, and should be selected according to the height of the fall; for instance, the Jonval type can be used for low falls of from 2 feet to 50 feet; the Lunedale, Victor, or the Girard types for over 30 feet, whilst Pelton wheels can be used up to 2,000 feet fall. Turbines are known as inward flow, outward flow, parallel flow, or combined parallel and radial flow types, according to the direction of the water passing through the motor.

An easy way to calculate the power obtainable from a fall is as follows: 1,000 cubic feet of water per minute falling 1 foot is equal to 1·9 Theoretical Horse-power, but owing to the different efficiencies of the machines, the actual horse-power obtainable will be: Overshot wheel, 1·25 h.p.; Breast wheel, 1·00 h.p.; Undershot wheel, 0·66 h.p.; Turbine, 1·50 h.p.

Hydraulic Rams.

These machines are very useful for lifting small quantities of water. The action is as follows:—



Water flows down the inlet pipe and out of the opening C, until it attains a sufficient speed to close the valve A; owing to the sudden stoppage of the water column the valve B is raised, and the water passes into the air chamber D and up the outlet pipe E. As soon as the energy in the moving column is utilized the valve A falls, and the water escapes at C until the velocity is sufficient to close it again, and this goes on in a continuous cycle. The air-chamber causes the ram to work easier, and gives a steady stream. The efficiency of the ram is from 50 to 70 per cent., thus, if the fall is 10 feet and 2,000 gallons per day has to be lifted 100 feet, the theoretical quantity of water required will be $\frac{2,000 \times 100}{10} = 20,000$ gallons.

but as the efficiency of the ram is only, say, 60 per cent., the quantity actually required to drive it will be $\frac{20,000 \times 100}{60} = 33,333$ gallons per day. By a slightly different arrangement to that shewn in above sketch, dirty water from a river can be utilized to raise clean water from a spring. A ram to do the above work will cost £40.

WINDMILLS.

Windmills are commonly used for raising water for domestic purposes, stock, irrigation, and driving machinery of a low power. In selecting a windmill the chief points to consider are: 1. Size of wheel. 2. Strength and height of tower. 3. Method of braking in high winds. 4. Oil supply. 5. Design of headgear.

There are a large number of mills on the market, and they are usually exhibited at the various Agricultural Shows in the Colony. It is almost invidious to mention any special mill, but it may not be out of place to say that the three best machines under test at the Port Elizabeth Show in 1907 were: 1. Canadian Imperial; 2. Samson; 3. Dandy.

When selecting a windmill it is also necessary to bear in mind where it is going to be erected, for a mill which will be successful in one part of the Colony will not be successful in another.

In practice it has been found that a wind of less than 10 miles per hour is of little practical service, but a wind of 15 miles per hour is sufficient, and can usually be relied upon to run for eight hours per day. Generally speaking, the number of hours per year when the wind exceeds 10 miles per hour is from 5,000 to 6,000 hours, or say, from 60 to 70 per cent. of the whole year. A 14 mile wind gives a pressure of about 1 lb. per square foot of sail area, and the efficiency of a windmill is about 30 per cent. of the energy of the cylinder of wind passing it.

The following table will give the approximate cost of Windmills at Port Elizabeth:—

Windmills.	Size of wheel in feet.	Height of Tower.	Price without Pump.
Dandy	16	40	£96
Do.	13	40	£52
Do.	10	40	£36
Do.	8	20	£23
Samson (East London)	12	40	£44
Imperial	12	30	£44
Do.	12	20	£40
Star	16	40	£69
Gem	12	40	£50

The power of windmills with a 15 mile wind varies from about ⅛ of a horse-power for an 8 feet mill to 3 horse-power for a 16 feet mill.

The following table shews the approximate duty of Windmills for lifting water 100 feet high, including friction, on short lengths of pipes:—

Diameter of wheel in feet.	Revolutions of wheel per minute in a 15-mile wind.	Water raised per 8-hour day, in gallons, 100 feet lift.
10	48	1,200
12	40	2,000
14	34	3,500
16	30	6,500
18	27	10,000
20	24	16,000
25	19	25,000
30	16	40,000
35	14	60,000
40	12	80,000

RAM PUMPS DRIVEN BY OIL ENGINES.

This type of pump (Fig. 1) is desirable for high lifts, and the native power can be transferred from the engine by a belt or friction clutch. The latter is most convenient, and the extra cost is only from £10 to £15 for

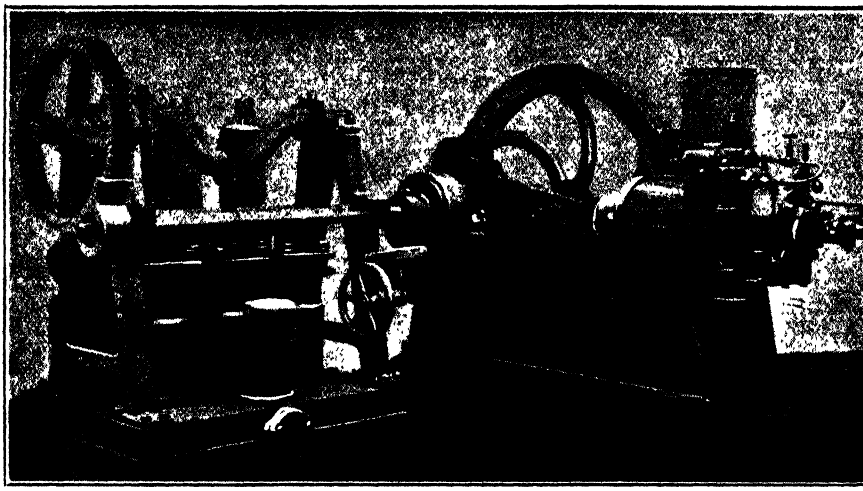


FIG. 1.

engines developing from 10 to 20 brake horse-power. If the plant is designed without a friction clutch between the engine and pump, it will be desirable to have fast and loose pulleys for the belting, so that the engine can be started without the pumps. The following table gives the brake horse-power required for pumping from 800 to 20,000 gallons per hour to a height of from 25 to 200 feet:—

Gallons per hour.	Total vertical height in feet from level of water in well or river to the tank or place to be delivered at:						Length of pipes about 3000 feet.
	25	50	75	100	150	200	Diameter of delivery pipes.
	Brake Horse Power required.						
800	1½	1½	1½	1½	1½	1½	2 inch.
1,300	1½	1½	1½	1½	2½	2½	2½ "
2,500	1½	1½	2½	2½	3½	5	2½ "
4,000	1½	2½	3½	5	6½	8	3½ "
6,400	2	3½	5	6½	9½	12½	4 "
8,800	2	5	6½	8	12½	16	5 "
11,500	2½	6½	8	9½	14	20	5 "
13,400	3½	6½	9½	12½	16	25	6 "
20,000	5	9½	14	18	25	40	7 "

Oil engines cost about £16 per b.h.p. when developing 10 to 12 brake horse-power, and £12 per b.h.p. for from 20 to 25 horse-power.

An 8-inch treble ram pump, with friction clutch and 10½ brake horse-power oil engine, will lift 12,000 gallons per hour, 100 feet high, and cost about £360, or £30 per horse-power, not including concrete foundation, fixing and galvanised iron building; these will add on another £30 or £40 to the cost, or say, £400 altogether.

Centrifugal Pumps Driven by Oil Engines.

The selection of a plant of this class requires a wide knowledge of the different kinds of centrifugal pumps on the market, and their name is legion. Tangyes, Gwynnes, and Evans are, however, well-known makes, and there is very little difference between the first two, although the writer prefers the "Invincible," made by Gwynne. Centrifugal pumps are much cheaper than ram pumps, the former costing from one-third to one-fourth that of the latter. The following table gives the approximate power required for driving centrifugal pumps, and it will be noticed that greater power is required for the same head and quantity of water than by ram pumps.

Approximate gallons per hour.	Lift in Feet.					
	20	30	40	50	60	70
	Brake Horse Power required.					
6,000	2½	3½	3½	5	6½	8
15,000	3½	6½	8	11	14	16
25,000	8	12	16	18	25	32
37,500	9½	14	18	20	32	40

A Centrifugal Pump for doing the same work on a 50 feet lift as the ram pump, already mentioned, would cost £50 for the pump and £180 for the engine, and, say, £30 for housing and foundation, making a total of £260, as compared with £400 for the ram pump plant.

The efficiency is about 30 per cent. less in the centrifugal than in the ram pump, and moreover it is undesirable to fix single centrifugals for heads of over 50 feet, although high lift or multiple centrifugal pumps (Fig. 2)

PUMP BY ALLEN & SON, BEDFORD.

Class	Three Stage High-lift Centrifugal Pump.
Water Pumped...	1,000,000 gallons in 24 hours.
Head	300 feet.
Efficiency ..	75% on rated lift.

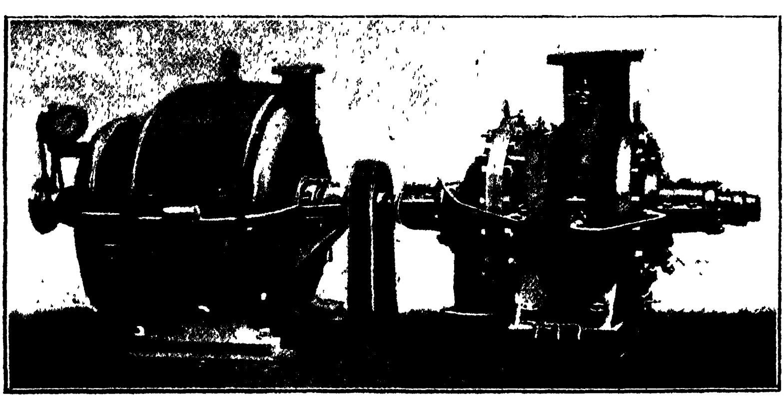


Fig. 2.—Electrically Driven.

have been successful on much higher lifts. A very handy form of portable pump has been designed by Messrs. Hathorn, Davey and Co., of Leeds. It is a combined petrol motor and centrifugal pump, mounted upon a spring cart. The cost varies from £135 for 120 gallons per minute, lifted 30 feet, to £200 for 600 gallons per minute, lifted 10 feet, and includes 15 feet of flexible armoured suction hose, foot valve and strainer.

Noria or bucket pumps, worked with horses or oxen, are often used with advantage for low lifts. The Aqua-Thruster or Pulsometer type of pumps are very handy for temporary purposes, but should never be used for a permanent plant, owing to the heavy cost for fuel. Within the last two years a new plant has been placed on the market, and is well worthy of consideration by farmers. It is known as

THE SUCTION GAS PLANT

(Fig. 3), and is worked in conjunction with a gas engine. The gas is made from charcoal, Anthracite coal, or coke in a generator, and passed through

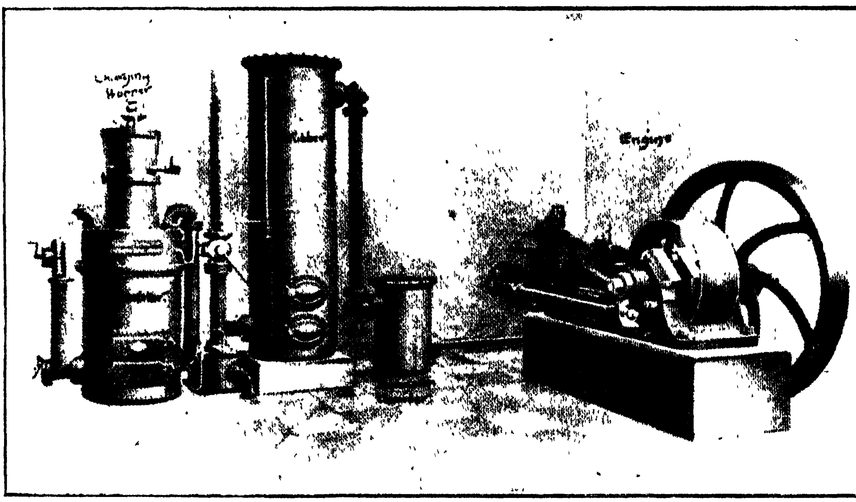


FIG. 3.

a scrubber to clean it before entering the engine, the gas being fired by magnetic ignition. When the plant is cold it takes about 2 hours to start, but when the fire is banked overnight the plant can be run in 15 minutes.

The official report on the trials made of suction gas producers, under the auspices of the Royal Agricultural Society at Derby last June, shows that the undermentioned fuel and water consumption may be expected with a good suction producer plant when working continuously and under the best conditions:—Anthracite: Full load, 1 lb. per b.h.p. hour, including fuel needed for starting and for banking during the night; half load, 1·6 lb. per b.h.p. hour, including coal for starting; water, 1 gallon per b.h.p. hour at full load, and ¾ gallon at half load. Coke. Full load, 1·3 lb. per b.h.p. hour, including fuel needed for starting; water, 1½ gallons per b.h.p. hour at full load.

A plant of this kind has been erected quite recently at Port Elizabeth, and cost under a half-penny per b.h.p., inclusive of coke, oil, labour, etc. A 12 b.h.p. plant, including producer and engine, will cost £185, and a 33 b.h.p. plant £375. Small plants cost about £15 per b.h.p.; large plants about £8 per b.h.p.

Of late years helical centrifugal pumps have made great headway, and they appear to have the greatest efficiency (83 per cent.) on a 36½ feet lift when running at 788 revolutions per minute, but the efficiency gradually decreases to 59 per cent. on a 110 feet lift and 1,290 revolutions per minute. The helical centrifugal has a much greater efficiency than the ordinary type of centrifugal pump, and can be used on higher lifts; the cost is only from 5 to 10 per cent. more than the ordinary type, and is in many ways preferable.

The approximate cost of Oil Engines and Centrifugal Pumps is given below:—

Cost of Engines.		Cost of Pumps.	
Brake Horse-power.	£	Size in inches.	£
1½	65	2	17
3	95	3	20
4½	125	4	28
8	145	6	40
12	188	7	48
17	220	8	60

The quantity of oil used per brake horse-power hour in the best engines when running at full power is about three-quarters of a pint. The cost of oil per case of 8·3 gallons at Port Elizabeth is 8s., or 1·45d. per pint, for White Rose, and 7s., or 1·27d. per pint, for Crown Oil. Allowing three-quarters of a pint per b.h.p. hour, the cost is 1·09d. for White Rose, and 0·95d. for Crown Oil. Thus, for a 10 h.p. engine, working 8 hours per day, and taking the price of oil at 1d. per b.h.p., the daily cost for fuel alone is 6s. 8d. Now a 10 h.p. engine and pump will lift about 13,500 gallons per hour 50 feet high, so the cost per 1,000 gallons is ·75 of a penny for oil alone, or, allowing for water, waste, lubricating oil and supervision, say, 1¼d. per 1,000 gallons.

The cost per pump horse-power, with large steam plants, at four Liverpool Pumping Stations, for the year 1904, is given below:—

	Pence.
Cost of fuel	0·1579
Wages and salaries	0·1512
Stores	0·0195
Repairs	0·1412
	0·4698 pence.

From these figures it will be seen that with large steam plants about one-third of the cost is for fuel, one-third for wages and salaries, and one-third for repairs and stores. The coal in the above case cost 10s. 4½d. and 7s. 4½d. per ton. A steam plant of 200 to 300 horse-power will cost from £30 to £40 per h.p., including boilers and other appurtenances. The quantity of coal used by steam plants varies from 1½ lbs. per h.p. in triple expansion, to about 2½ lbs. in compound engines, although in many cases, with small plants such as are used on farms, the coal consumption may rise to 6 lbs. per h.p., or with wood 12 lbs. per h.p. A gas engine uses from 16 to 18 cubic feet per h.p., and, with gas at 1s. 6d. per 1,000 cubic feet, will cost 1½d. per h.p. hour. Good oil engines, such as made by Crossley, Hornsby-Ackroyd, Rushton, Proctor or Campbell consume from ¾ to 1 pint of oil per brake horse-power hour, at a cost for fuel alone of one penny. With crude oil, which can be used with advantage in engines over 16 h.p., the

cost may be reduced to ·75d. per b.h.p. Crown Oil is now being used to a great extent in place of White Rose, and from tests carried out by the writer, does quite as well, and is ·12½ per cent. cheaper. The Diesel oil engine is one of the cheapest from a fuel point of view, but the capital cost of small plants is very high. The heat efficiency of oil engines varies from about 20 per cent. to 40 per cent. of the total heat in the oil, and in steam plants it varies between 6 per cent. and 20 per cent. of the heat in the coal. The mechanical efficiency of engines varies from about 70 per cent. to 92 per cent.

The quantity of water required per annum to irrigate an acre of ground in the Eastern Province during a year of ordinary rainfall may be taken to be between 250,000 and 500,000 gallons for ordinary crops and about 600,000 to 750,000 gallons for lucerne and vegetables. If we assume 400,000 gallons per acre and the cost of pumping at 1¼d. per 1,000 gallons lifted 50 feet high the cost per acre annum will be £2 1s. 8d. Taking the irrigation period as 100 days, the pump working 8 hours per day and 400,000 gallons required per acre annum, the 10 b.h.p. engine and pump should supply 30 acres, but in practice owing to various causes it would not be safe to rely upon the plant irrigating more than 25 acres in a dry year with the engines working 8 hours per day.

Where wood or coal can be obtained at a low rate it is sometimes cheaper to run a portable engine and boiler for driving the pump. These engines are rated by the nominal horse-power which is about three times greater than the brake horse-power—thus a 6 n.h.p. is rated at 18 b.h.p. and a 10 n.h.p. at 30 b.h.p., and this must be borne in mind when ordering a plant.

The following are the prices of portable engines at Port Elizabeth:—6 n.h.p., £250; 8 n.h.p., £300; 10 n.h.p., £330; 12 n.h.p., £410; 16 n.h.p., £545. If a pump is erected in a town where electricity is generated on a larger scale it may be advisable to adopt this method of driving, but under all circumstances consider the comparative cost of working expenses as well as the capital cost when choosing a pumping plant.

The following table shews the theoretical height of a column of water which can be supported by the atmospheric pressures at different elevations:—

Height above sea-level.	Atmospheric pressure in lbs. per sq. inch.	Theoretical Head in feet.
Sea-level	14·7	33·98
500	14·5	33·50
1,000	14·1	32·57
2,000	13·6	31·42
3,000	13·1	30·26
4,000	12·6	29·10
5,000	12·1	27·85
6,000	11·7	27·03

The above table shews a difference of ½ lb. pressure, or 1·15 feet head, for each 1,000 feet elevation. In practice, however, these theoretical heights cannot be obtained and should be reduced by about one-fourth; for instance, at Port Elizabeth (sea level) the atmospheric pressure is 14·7 lbs. per square inch, which is equal to 33·98 feet of water; reducing this by one-fourth the practical height from water level in pond, or river, to pump would be 25·45 feet. If the pump is fixed in the neighbourhood of Johannesburg, which is situated about 6,000 feet above sea-level, the practical height would be 27·03, less one-fourth, or 20·27 feet. A pump should be placed as near the water as possible, but out of the range of floods.

Evaporation of Water by different Fuels.

	Lbs. of water evaporated per lb. of fuel.
Petroleum	14·50
Anthracite	7·20
Average coal	6·50
Small coal	5·53
Coke with 4 per cent. ash	5·53
Coke with 15 per cent. ash	6·27
Wood, perfectly dry	3·32
Wood with 25 per cent. of water	2·58
Best Peat with 25 per cent. of water	2·77

These figures may be taken as a fair average, but better results have been obtained under the best conditions. When burning solid fuel it is necessary to have a large excess of air, but with petroleum such excess is not required. Soot should always be regularly removed from boiler tubes as it lessens the evaporative efficiency considerably. Theoretically 12 lbs. of air will burn 1 lb. of coal, but in practice from 18 to 25 lbs. are necessary. Care should also be taken with the amount of air supplied, as too much air reduces the quantity of water evaporated per unit of fuel; for instance, with 20 lbs. of air admitted to a furnace, 8 lbs. of water were. evaporated as compared with 7 lbs. when 25 lbs. of air were used. The weight of coal varies from 46·8 lbs. to 58·2 lbs. per cubic foot when loosely heaped. The calorific value of fuels varies greatly, and for coal may be taken to be between 9,000 and 15,000 British thermal units, and for petroleum about 18,000 to 19,000 B.T.U. A British thermal unit is the amount of heat required to raise one pound of water 1° F. at a maximum density of 39·1° F. A horse-power is 33,000 ft. lbs. per second, or equal to 2,545 B.T. units. The mechanical equivalent of heat as laid down by Joule is equal to 772 lbs. being raised one foot high, but later researches by Rowland have shewn the equivalent to be 778 lbs. The theoretical energy in a pound of coal having a calorific value of 14,500 B.T.U. is therefore 11,194,000 foot lbs.

Measurement of Water.

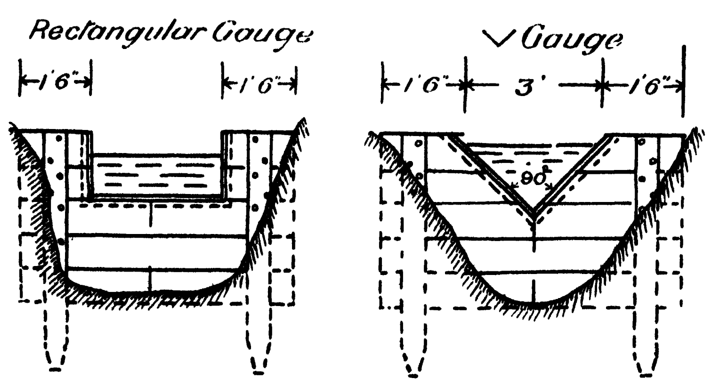
The quantity of water flowing down a river or stream may be obtained in many ways, but the easiest method for the farmer is to erect a rectangular or V gauge. The rectangular gauge is better suited for large volumes and the V notch for small volumes of water. The gauges are fixed vertically at right angles to the flow of the water, and the depth is measured from a peg driven in the river bed, level with the sill and from 2 to 10 feet upstream of the gauge, according to the approaching velocity. The section of the water flowing through the notch should not exceed one-fifth that of the approaching stream. The length of the rectangular gauge as compared to the depth flowing over may be taken as 4 to 1, thus a 2-feet gauge for 6 inches of water; a 3-feet gauge for 9 inches of water; a 4-feet gauge for 12 inches of water. A rough approximation for the discharge of a rectangular gauge can be obtained from the formula: $Q = 5 \cdot 15\sqrt{H^3}$; where Q=cubic feet per minute, and E=depth in inches. In the case of a V notch the formula is. $Q=C{,}305\sqrt{H^5}$, Q and H being similar to above.

The following table shews the discharges for both kinds of gauges in gallons per day: —

Depth in inches.	Per day of 24 hours. Rectangular Gauge 12 ins. wide. Gallons.	V. Gauge Gallons.
¼	5,765	85
½	16,312	496
¾	29,437	1,332
1	46,137	2,745
1½	84,758	7,560
2	130,498	15,570
2½	182,370	27,090
3	239,730	42,750
3½	302,054	62,910
4	369,100	87,940
4½	440,467	117,900
5	515,818	153,450
5½	594,960	194,760
6	678,056	242,010
7	855,077	350,860
8	1,043,960	496,800
9	1,245,715	666,900
10	1,458,960	867,600
11	1,683,240	1,101,600
12	1,917,900	1,363,900
13	2,162,940	1,672,200
14	2,416,790	2,013,300
15	2,680,290	2,392,200

The quantity of water passing through a pipe is measured by a meter inserted in the pipe line and the best meter to use for this purpose is that known as the "Venturi."

If the pipe is a small one, the quantity can be measured with a can of known capacity.



To Obtain the Approximate Discharge of a River or Stream.

Select a portion of the stream about 100 feet in length where the banks are fairly straight, the cross section uniform and the stream has a smooth bed. Take a sectional area of the stream at several places, say 5, and find the average area. Now place either a weighted wooden ball or an orange

in the stream a little way above the commencement of the 100 feet length and take the time by a stop watch when it passes the first section, take the time again on reaching the end of the 100 feet length, then $\frac{100}{\text{No. of Seconds.}}$ = Linear velocity in feet per second. A reduction of this velocity must however be made because the float follows the centre of the stream, and the speed is the greatest at this point. For most small rivers or sluits with a fairly uniform section and free from weeds, the average velocity may be taken from 75 to 85 per cent. of the centre velocity

Example.—Length of section 100 feet. Time travelling from 0 to 100 feet = 50 seconds. Therefore velocity = $\frac{100}{50}$ = 2 feet per second. Average velocity of section, $2 \times 0{\cdot}8 = 1{\cdot}6$ feet per second. Area of average section of stream 9 square feet. Therefore delivery per second = $1{\cdot}6 \times 9 = 14{\cdot}4$ cubic feet = $14{\cdot}4 \times 6\frac{1}{4} \times 60 = 5{,}400$ gallons per minute.

It may be noted here that an orange, or a round wood ball weighted to the specific gravity of water are the best class of floats to use for this purpose. The specific gravity of an orange is such that only about $\frac{1}{4}$ inch is out of the water, and this presents a less surface than a bottle to the force of the wind. The spherical shape of the orange also causes it to pass round obstacles much easier than an object of any other form.

Design of Pipe Lines.

The delivery of a pipe depends mainly upon the diameter and inclination, but the best formulas, such as Darcy's, Hazen, Kutter's and Unwin's, introduce varying co-efficients for the diameter, velocity and rugosity or roughness of surface. In laying out a pipe line there are many points to consider, and they will be briefly dealt with. Let us first take a pipe line which has only one hydraulic gradient between the inlet and outlet Fig. I. Suppose a pipe laid along the ground A.A.A. and a line drawn from K to M; if the straight line passes over the top of all hills, a pipe line of one diameter only is required, and the line K.M. is known as the hydraulic gradient. If glass tubes B.C with open ends were fixed in the pipe at the points C., the pressure would cause the water to rise to the points F, when the reservoir was empty, or points E when the reservoir was full and the valve at M fully open. If the valve M is shut the pressure will rise to points B level with the water in the reservoir, and this is known as the static head. These pressures are taken in practice by a pressure gauge such as Bourdon's, which gives the result in pounds per square inch and head in feet. In the former case with the inclined lines the water is in motion while in the latter it is at rest. The difference in level between any points F.F. or E.E. will give the head lost through friction in that section of the main.

Compound Mains.—In Fig. 2 two sizes of pipes are necessary, one from B to E and the other from E to C unless the hill F.E. is penetrated by a tunnel a little below the line at F. The fact of the line A.C. rising above the hill need not be considered, as the pipe must deliver the full quantity of water when the reservoir (K) is nearly empty.

If a tunnel is made at F. it should be at least from 5 to 10 feet below the hydraulic gradient, but as we are dealing with a compound main of two gradients we need not consider it further. Owing to the hydraulic gradient being on a less incline between B and E than between E and C, it will require a larger pipe on the upper section to deliver the same quantity, but there are many cases where the slope or fall per mile is less at the lower end and in that case the largest pipe would be from E to C.

The fact of a pipe varying in depth below the hydraulic gradient does not make any difference in the discharge, as the friction losses per foot are

the same at all pressures. If the end of the pipe M. Fig. 1 or C. Fig. 2 enters below the surface of the water in the service reservoir, the gradient will finish at the water surface level and not at the centre of the pipe. There may be any number of gradients on a long pipe line, and it does not follow that the sizes of the pipes will be increased or decreased in diameter, evenly from the storage to the service reservoir; it may be that the contour of the ground necessitates pipes in the following order:—18 in., 21 in., 16 in., and 12 in. or 21 in., 12 in. and 18 in. or any other combination to obtain equal deliveries on ground with different inclinations.

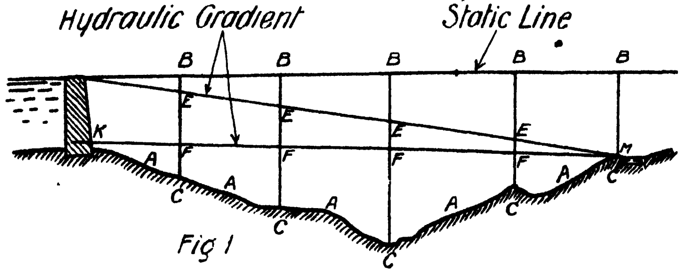


Fig 1

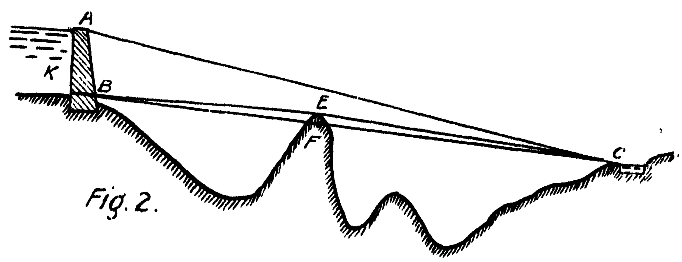


Fig. 2.

PIPE DISCHARGES.

The following table shews the loss of head in feet due to friction for each 100 feet of pipe:—

Delivery in Gallons per Minute.	Sizes of Pipe.—Inside Diameter.						
	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
5	6·6	1·68	0·62	0·24	0·06		
10	26·0	6·32	2·10	0·94	0·24	0·06	
15	57·4	13·96	4·76	1·94	0·54	0·12	
20	100·8	24·6	8·14	3·32	0·84	0·26	0·06
25	156·0	38·0	12·80	5·24	1·34	0·42	0·20
30		55·0	18·30	7·50	1·82	0·60	0·24
35		74·0	24·8	10·10	2·52	0·84	0·28
40		96·0	32·2	13·04	3·20	1·02	0·34
45			40·4	16·30	4·02	1·24	0·54
50			49·8	20·0	4·88	1·62	0·70
75			112·2	44·8	10·64	3·60	1·48
100				78·0	19·92	6·40	2·62
125					29·8	9·78	3·98
150					42·4	14·0	5·70
175					56·2	18·92	7·70
200					75·0	25·94	10·04
250						39·32	15·52
300						54·12	22·40

Example:—Suppose a pipe 500 feet long and 2 inches diameter, and we require the loss of head due to a delivery of 20 gallons per minute. Opposite 20 in the left-hand column and under 2 inch in the sixth column the loss is shewn as 0·84 feet per 100 feet length, and as there is 500 feet of pipe, the loss would be $0{\cdot}84 \times 5 = 4{\cdot}20$ feet. If the water has to be lifted 30 feet then the total head against the pump will be $30 + 4{\cdot}20$ or 34·2 feet.*

The contents of a pipe in gallons can be obtained by the formula $\frac{D^2 \times L}{10}$ D. being diameter in inches and L. length in yards.

Cost of Pipes and Laying.

The cost of excavating the trenches to a depth of 3 feet will vary from about 7d. to 1s. 2d. per cubic yard for earth and 4s. to 10s. for rock. The approximate cost of laying in earth with trenches 3 feet deep, including cost of pipes, may be taken as follows:—

Diameter.	Cost per yard.
3 inch to 9 inch	1s. 6d. per inch diameter.
9 inch to 12 inch	2s. per inch diameter.
12 inch to 18 inch	2s. 6d. per inch diameter.

Sharp bends should be avoided where possible and the following points attended to.

Sluice Valves.—Place valves at beginning and end of pipe line, and if the line is a long one at intermediate points about one mile apart.

Air Valves.—To avoid air-locks in the pipe, place an air valve at the top of each rise.

Washouts.—Fix a washout valve in each depression for emptying the pipe in case repairs are needed and also to wash out the pipe occasionally.

Jointing.—In the case of screwed joints put a little white or red lead on the thread before screwing up. If the joints are of the socket type put in two rings of hemp and then run with lead and caulk the joint. The lead should be from 1½ inches in the small to 2½ inches wide in the large pipes, and about ¾ lb. of lead will be used per inch diameter of pipe—thus for a 6-inch pipe $\frac{3}{4} \times 6 = 4\frac{1}{2}$ lb. of lead. Shredded lead is now being commonly used for jointing, and does not require melting, or, in other words, can be set up cold. The cost is about double that of pig lead.

The cost of steel pipes is about £20 per ton, and the following table gives the price per foot run at Port Elizabeth for coated pipes:—

Diameter in inches.	Thickness.	Price per foot run. s. d.
2	3/32	0 6¼
3	3/32	0 10¾
4	1/8	1 3
5	1/8	1 7½
6	1/8	2 10
7	3/16	3 4
8	3/16	3 9
9	3/16	4 3
10	3/16	4 6
12	1/4	7 3
15	1/4	8 9
18	5/16	12 6

* For larger pipes the formula $V = C\sqrt{R.S.}$ can be used and as C varies from 110 to 140 for new pipes 100 will be a safe figure to take—therefore $V = 100\sqrt{R.S}$, S being sine of slope, and R hydraulic mean radius. See discharge of channels for further information.

Cast iron pipes weigh from 3 to 4 times as much as steel ones of the same strength, for whereas cast iron will stand from 7 to 10 tons per square inch in tension, mild steel will stand from 25 to 30 tons; the price of cast iron pipes in Cape Colony is about £7 to £8 per ton as compared with £20 for steel

It will therefore be seen that transport and handling of pipes play a large part in deciding which class to use.

Irrigation Works and Methods of Irrigating.

Irrigation works comprise:

Head and Regulating Works.
Main Canal, including the necessary bridges and roads.
Distributaries and Laterals.
Drainage.

The head works (Fig. 1) include the weir and sluices, and also the works at the head of the canal to control the water admitted to it. The main canal should have a slope of from 1 in 2,680 to 1 in 33,000 and de-

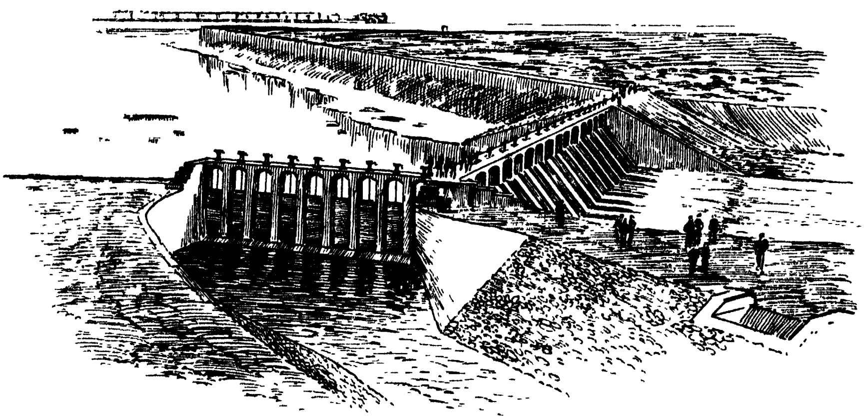
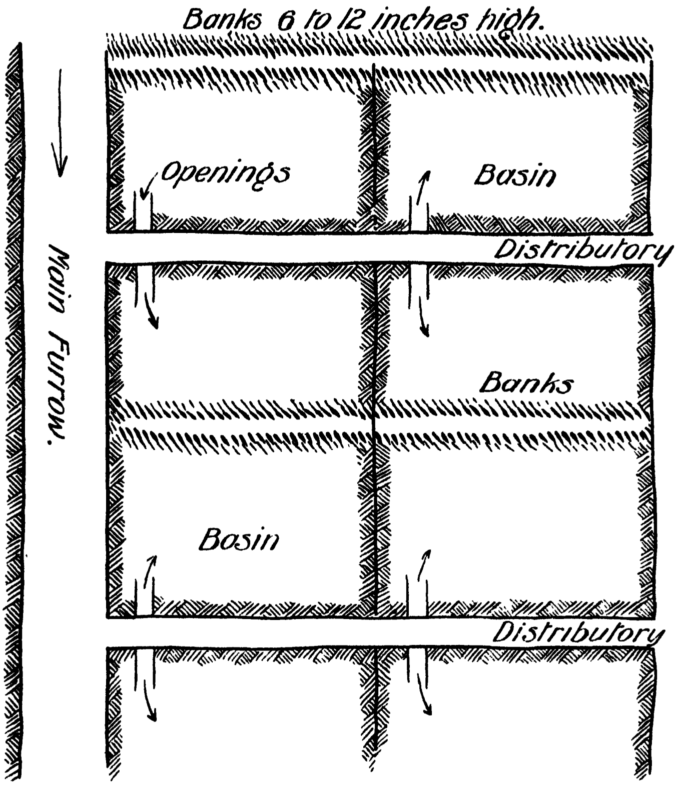


Fig. 1.—Head Works.
The Avalon Dam, Carlsbad Project, U.S.A.

pends largely upon the levels of the country and the nature of the soil. In India the slope varies from 1 in 4,000 to 1 in 10,000, while in flat valleys, such as the Nile in Egypt, the slope varies between 1 in 20,000 to 1 in 33,000. A good velocity for the water in the main canals is from 2 feet to 3 feet per second according to the class of soil. In fixing the duty of an irrigation scheme the loss due to evaporation and percolation must be taken into consideration as the loss on Indian canals has been shewn to be from 10 to 70 per cent. From 400,000 to 500,000 gallons per acre per annum is usually sufficient with a rainfall of from 24 to 30 inches, and this quantity is increased to 1,000,000 gallons per annum with such crops as lucerne with a rainfall of from 4 to 10 inches. If, therefore, say 600,000 gallons are required per annum for cultivation, the main channel must be large enough to deliver 800,000 gallons per acre annum when the loss is 33 per cent. Where water is very scarce it has been found that tilling the soil is of great benefit in reducing evaporation. The method of irrigating land varies in different countries and even in different districts as follows:—Shallow furrows, Deep furrows, Check Levees, Flooding, Inundation, Sub-irrigation.

Furrow irrigation is usually adopted for orchards, and the water should be distributed above the hair-like roots some distance from the trunk of the tree. Check levees are employed as shewn in the following sketch: —



Flooding is adopted for such crops as lucerne and potatoes, and the water in this case is allowed to run over the beds from one end to the other. Inundation irrigation is such as practised on the Nile. where flood water is diverted on to the land, and silt is deposited. Sub-irrigation for orchards has not been very successful, the water in this case being carried in pipes underground. Surface flooding is wasteful as shewn by the results of experiments in California during the months of September and October. The average evaporation from land treated by surface irrigation being 6·428 cubic feet per acre; shallow furrow irrigation, 5·581 cubic feet per acre; deep furrow irrigation, 4·816 cubic feet per acre.

Water is not only required to build up the plant, but also as a carrier of food and great deserts are not sterile because of insufficient food for plants, but because there is not sufficient water to help the plants in assimilating the food. The harmful effects of over irrigation is sometimes seen in the production of alkali and flocculent salts and by souring or water logging. The salt may be common salt (sodium chloride), black alkali (sodium carbonate), or sodium sulphate; land troubled with these alkalies can be improved by leaching—that is, flooding and draining off, and by the addition of chemicals or by under drainage. Black alkali is said to be the most detrimental, and is the most difficult to remove.

Irrigation Channels.

Irrigation channels must be designed for the duty they have to perform, taking into consideration the maximum speed desirable for the

material through which the water has to flow. The following velocities should not be exceeded:—Friable earth, 3 feet per second; hard earth, 4 feet per second; clay, 5 feet per second. In rock the velocity does not matter so much, and from 5 to 7 feet per second may be allowed. Taking everything into consideration, a velocity of 2 feet per second may be safely allowed through earth channels in this neighbourhood, and is found sufficient to carry silt brought down by the Sunday's, Gamtoos and Fish Rivers. The following table shews the number of acres which can be irrigated with different velocities and sizes of channels:—

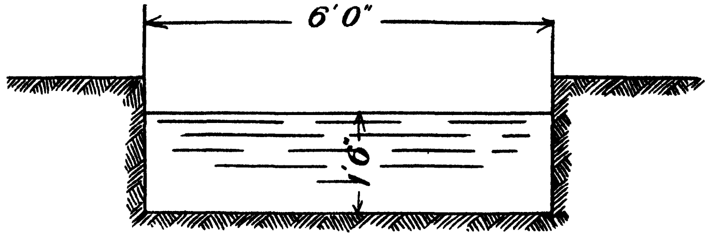
Number of Acres.	Velocity in feet per second. 2 feet.	3 feet.	5 feet.
	Area of Channels in sq. feet.		
100	1	0·66	0·4
300	3	2	1·2
500	5	3·3	2·0
640 (one square mile) ...	6·4	4·26	2·56
1,000	10	6·7	4·0
2,000	20	13·3	8·0

For small channels, with a velocity of 2 feet per second, the ratio of width to depth may be taken as 4 to 1—thus, for 100 acres, 2 feet wide and 6 inches deep will be sufficient, while for 2,000 acres the width to depth may be as 8 to 1 or 8 feet wide and 2 feet 6 inches deep. The slope of the channel to give the above velocities will vary according to the hydraulic mean depth as shewn in table below. The side slopes will vary with the material, but 1½ horizontal to 1 vertical is safe for most kinds of earth, and a batter of one horizontal to 8 vertical for most classes of rock.

Kutter's formula is generally used for the discharge of channels, and the velocity for ordinary earth channels of good regimen (n=·0225) can be obtained from the formula. Velocity in feet per second $= C\sqrt{R.S.}$ R= being the hydraulic mean radius. S = Sine of slope. C = A coefficient for rugosity or roughness of channel, which varies considerably, as shewn in the following table. R is obtained by dividing the area of water in square feet by the wetted perimeter or border in lineal feet. S is the ratio of fall to length, expressed in the same units thus, 1 foot in 5,000 feet. V = Velocity in feet per second.

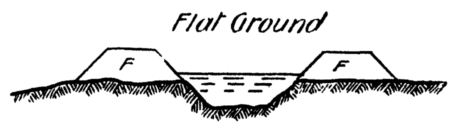
$\sqrt{R}$ →			0·7		1·0		1·6		2·5	
	Slope.		C	V	C	V	C	V	C	V
1 in	Fall per mile.	Ratio.								
	ft. in.									
1000	5·3⅜	·001	51·5	1·17	62·5	2·01	80·3	4·88	89·2	7·08
1250	4·2 11/16	·0008	51·3	1·04	62·3	1·79	80·3	4·17	89·3	6·38
1666·$\dot{6}$	3·2	·0006	51·0	·85	62·1	1·54	80·3	3·58	89·5	5·54
2500	2·1⅜	·0004	50·4	·72	61·7	1·25	80·3	2·95	89·8	4·54
3333·$\dot{3}$	1·7	·0003	49·8	·62	61·2	1·07	80·3	2·54	90·1	3·94
5000	1·0 11/16	·0002	48·9	·50	60·5	·87	80·3	2·05	90·7	3·24
7500	8 7/16	·000133	47·5	·42	59·4	·73	80·3	1·77	91·5	2·78
10000	6⅜	·0001	46·4	·34	58·5	·60	80·3	1·49	92·3	2·33

Example: — Slope 1 in 5,000.

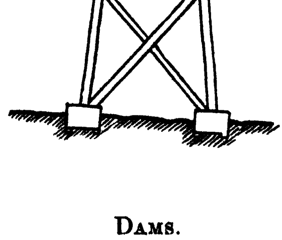


The area is 6 x $1\frac{1}{2} = 9$ square feet. The wetted border $6 + 1\frac{1}{2} + 1\frac{1}{2} = 9$ lineal feet, $R = \frac{9}{9} = 1{\cdot}0$, but we require the $\sqrt{R}$, which is also 1 in this special case. Now look under column $\sqrt{R} = 1{\cdot}0$ in table, and opposite 1 in 5,000, and we find $V = {\cdot}87$ feet per second, which multiplied by the cross section of the channel (6 x $1\frac{1}{2}$) x $\cdot87 = 7\cdot83$ cubic feet per second, or 4,228,200 gallons per day.

When channels are made on sloping ground, excavate the full depth to water level out of the original ground, but on flat ground the water level may rise above the original ground level, as shewn in the following sketches: —



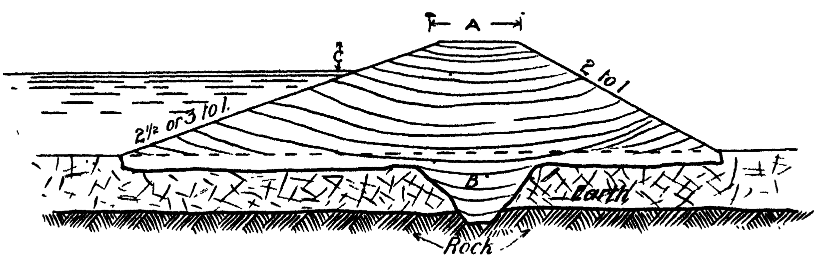
Where it is necessary to carry the water across a stream, it may be done either by pipes or flumes, care being taken to place them on stone or concrete piers well above flood level. If, however, the water is carried under the river, see that the pipe is laid about 3 feet under the bed. In crossing hollows or kloofs, wood or iron flumes can be constructed on trestles, as shewn in sketch.



Dams.

Dams for conserving or regulating water for irrigation can be made in many different ways; they may be of earth, with or without puddle or concrete core walls, masonry, concrete, timber, rock-fill, steel or reinforced con-

crete. The irrigation dams in Cape Colony are usually constructed of earth, masonry or concrete, and the former has very rarely a central core or cut-off wall. The following sketch shews a section of an earth dam:—

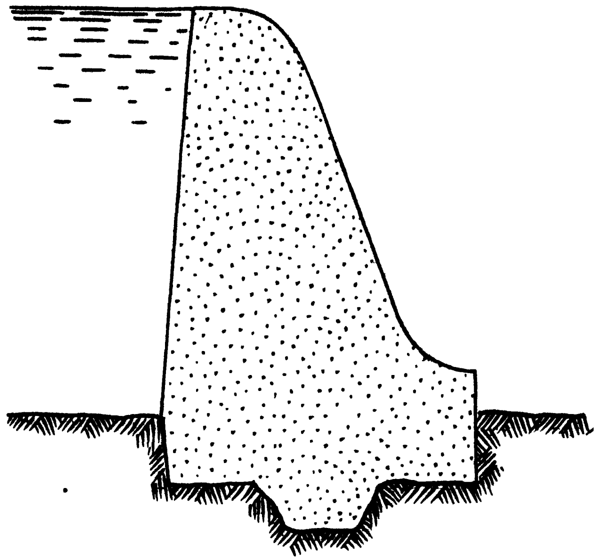


The width A will vary according to the height of the dam, but is generally from 6 feet to 9 feet for a 20 feet dam; the slope on the water side should not be less than 2½ to 1 (3 to 1 is much better), and the down stream slope 2 to 1. The water level in flood time should never reach the top of the dam, or failure will result; a good depth to allow for C will be from 4 to 5 feet, if the dam is constructed on a stream or river, but in a dam used for storing pumped water only, C may be as little as 2 feet. Before commencing the design of a dam the following particulars should be known: (1) Rainfall; (2) Area of Catchment; (3) Geological formation of Catchment Area; (4) Nature of foundation for Dam; (5) Run-off; (6) Materials for Construction.

We must then take into account the following points, for on these depend the safety of the dam: (1) Waste Weir; (2) Outlet Pipe; (3) Permeability of materials for dam; (4) Good Foundation. The waste weir should be designed so as to discharge the greatest flood, with a depth of, say, 2 feet, and the outlet pipe should, if possible, be placed away from the deepest portion of the dam. A large number of failures have been due to bad design of waste weirs and outlet pipes, and such works as these, for dams above 15 feet high, should be designed by an engineer. The earth should be tested to see if it is suitable for forming the dam; clay or clayey earth are the best, but soils which are of no use by themselves can often be used in combination with other materials. If the site selected is of ordinary earth, it may be necessary to cut a trench down to impermeable material or solid rock, as shewn at B. In England it is usual to place a centre core wall of puddle or concrete, but it is not always advisable to use puddle in very hot climates, as it cracks when the water dries out. Earth settles from 1 to 2 inches per foot in depth when tipped into a bank, and allowance must be made for this.

It is a common practice in this country to consolidate the bank by allowing cattle or sheep to tramp backwards and forwards over it, the earth being slightly watered in the meantime. When a bank is liable to be washed by waves, it should be protected on the water face with pitching made of rough stone from 9 inches to 12 inches thick. Masonry dams are made of large or small stones laid in hydraulic mortar, while concrete, as its name implies, is made of broken stone, sand and Portland cement, in the proportions of about 5 stone, 2 sand, 1 cement—the stone being broken to pass through a 1½ or 2 inch ring. All materials used for this work should be thoroughly clean. The width of such a dam should be not less than two-thirds the depth of water in flood time.

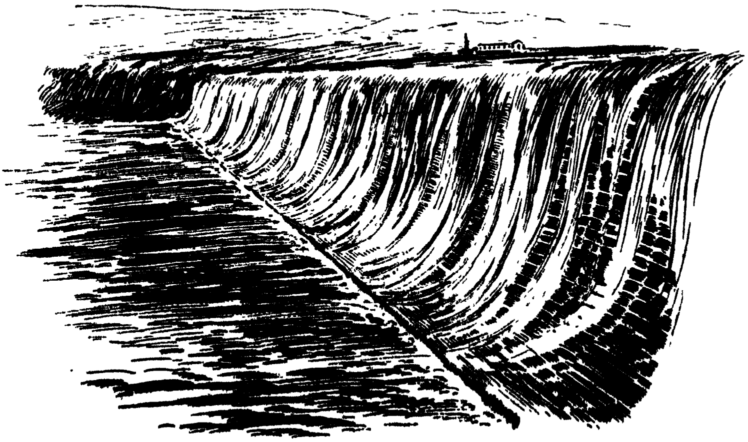
A good form for low concrete dams is shewn below, with the bottom of the wall keyed into the rock.



This class of dam is very rarely built on an earth foundation, owing to fear of settlement.

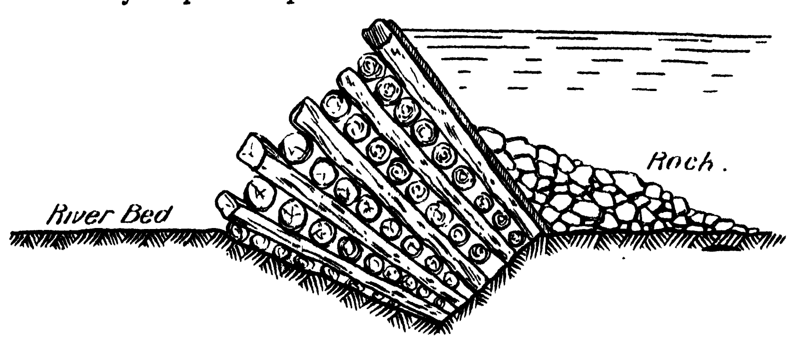
Photographs shewing the Austin Dam, Texas, before and after failure.

April 7th, 1900.



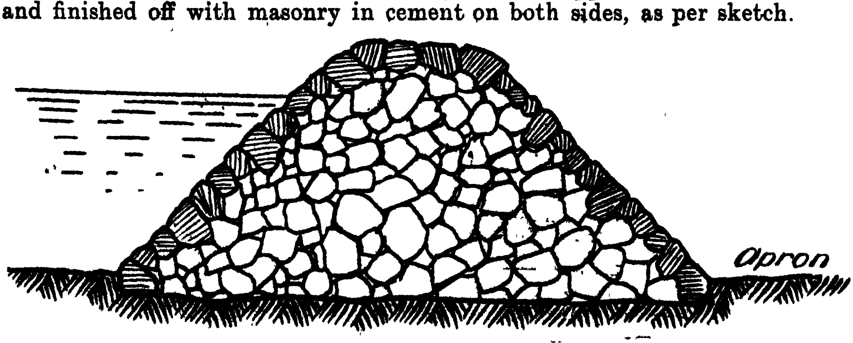
The dam cost £122,000, and the failure is reported due to inferior foundations.

Timber or Crib-work dams are only constructed in places where it would be too costly to erect any other kind of dam; the life of timber dams is comparatively short, and they are always requiring repairs, and, more especially so, if the dam is not constantly covered with water. This class of dam is not often used, except as a weir for raising the water level in a river. A very simple example of this class of dam is shewn below.



A trench is cut in the bed of the river, and trees laid across the stream, with other small trees or planks nailed on at right angles; the facing is made of 9″ x 3″ planks, fastened securely to the sub-structure and the joints covered with strips of wood. An apron of rough stone is also advisable on the inner toe of the dam.

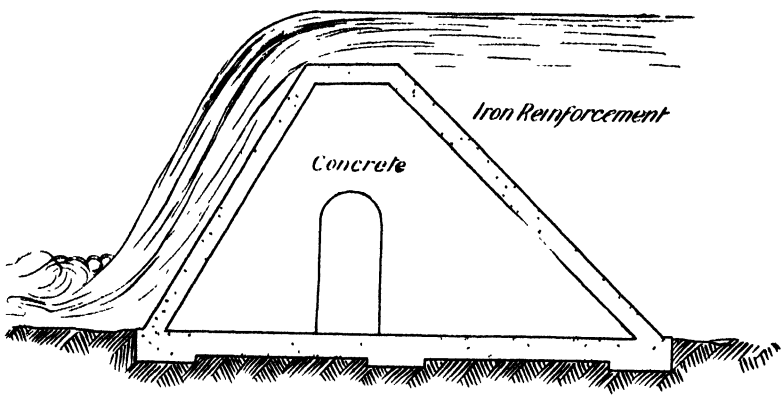
Rock-fill dams are made with large stones tipped into the river bed, and finished off with masonry in cement on both sides, as per sketch.



Aprons are absolutely necessary where the material can be easily eroded below the dam.

Aprons are absolutely necessary where the materia can be easily eroded below the dam.

In America several dams have been constructed of steel joists and plates, but they cannot be said to be a complete success. Reinforced concrete dams are safe and comparatively cheap; they are made of concrete in the following manner: —



In building dams and laying out irrigation sluits, for even moderate sized schemes, it will well repay farmers to consult an engineer before commencing the work.

FLOOD WATER AND WASTE WEIR.

Where statistics have not been kept of the flood discharges from any catchment area, it becomes necessary to employ one of the many formula for obtaining such discharge, and the author suggests the following formula for the length of waste weir for reservoirs constructed in South Africa:

$$\text{Length of overflow in feet} = \sqrt{\text{acreage of catchment area x maximum daily rainfall in inches.}}$$

Like most of the empirical formulæ dealing with this subject, the above formula does not take into consideration percolation, absorption, and steepness of sides, but it introduces the factor of rainfall, which is left out in the formula of Col. Dickens, Mr. Dredge, and the one commonly used in the United States.

The following table gives the length of overflow for various areas and rainfall by the above formula. The greatest floods with these lengths will be from 2 ft. to 2 ft. 6 in. over the weirs.

Table giving length of overflow in feet.

Area of Catchment in acres.	Greatest Daily Rainfall in Inches.						
	2	3	4	5	6	7	8
	Length of Overflow in Feet.						
1,000	45	55	64	71	78	84	90
2,000	64	78	90	100	109	119	127
3,000	78	95	109	122	134	145	155
4,000	90	109	127	141	155	168	179
5,000	100	122	141	158	173	187	200
10,000	141	173	200	224	245	265	283
20,000	200	245	283	316	347	375	400
50,000	316	387	447	500	547	591	632
100,000	447	547	632	707	775	837	895

The bye-wash below the overflow weir must be designed to deliver the highest flood discharge without generating too great a velocity in the channel, and this work requires great solidarity to withstand effectually the force of the falling water.

Another method would be to design the overflow to discharge one inch of rain per hour on catchment areas over 50 square miles in extent, $1\frac{1}{2}$ inches from 10 to 50 square miles, and 2 inches below 10 square miles, bearing in mind that large reservoirs have a regulating effect on floods.

Irrigation.

Irrigation is the art of conserving and directing water on to land for increasing and insuring the crops. Irrigation is practised on a small scale in Cape Colony as compared with irrigation in India, Egypt, Italy, Spain, and the Western States of America. In India alone no less than 31,000,000 acres are under cultivation, and give a profit of from 5 to 9 per cent. on the capital outlay of £68,000,000, while the Shidpani scheme yields 25·28, the Lower Chenab 24·28, and the Eastern Jumna 22·82; on the other hand, the Bengal Works only return 1·59 per cent. The average cost of large irrigation works in India is 25 rupees, or at 1s. 4d. the rupee, say, from 33s. to 34s. per acre. In India districts which some years ago were practically uninhabitable are now carrying large populations. The Chenab Canal alone serves an area of 1,827,000 acres, and supports 800,000 people. The size of some of the India works can be gauged by the following particulars of the Ganges Canal: Length of main and distributing channels, 9,900 miles; main canal, 200 feet wide, 10 feet deep, and discharges 10,000 cubic feet per second, or 5,400 million gallons per day; area irrigated, 1,700,000 acres. The Punjaub schemes have cost about £7,000,000, and irrigate between 5 and 6 million acres; the net revenue after paying all costs is 11 per cent., and the official crop returns for 1902-3 were no less than £8,000,000. In Egypt over £6,500,000 has been spent on irrigation works, and the rent of the land increased by £2,637,000 per annum, while the value of the land has increased by £26,570,000.

In the Western States of America there are 10,000,000 acres under irrigation. The land before irrigation was worth from 10s. to 20s. per acre, whereas the price now is £8 10s. an acre, shewing an increased value of from 8 to 17 times the original price. The cost of the schemes worked out at 32s. per acre, and the annual water rent varies from £2 8s. to £4 per acre, with an additional rate of from 2s. to 10s. for maintenance.

In Cape Colony the average cost of large works is about £14 per acre, but many schemes have been carried out at about £4 to £5 per acre. Works on small farms, where water is taken direct from the river by a small dam and sluit, cost only from £1 to £3 per acre, a very small sum when the increased value of the land is taken into consideration. Land which is worth from 3s. to £3 without water, will increase in value from £20 to £100 with water. The charges for irrigation water in Cape Colony vary from about 10s. to £2 per acre, and when pumping plants are necessary the cost should not exceed £2 or £3 per acre, irrigated on a 50 feet lift. The charge for water is generally between 12 and 20 per cent. of the value of the crop. The quantity of water required in the Eastern Province will vary according to the season and situation, but may be taken as from 250,000 to 350,000 gallons per acre in wet years, and from 400,000 to 500,000 gallons per acre in dry years, for crops other than lucerne. With lucerne, where from 4 to 6 crops per annum are grown, the quantity required will be between 400,000 and 750,000 gallons per acre in the Eastern Province. Vegetables are, as a rule, a good paying crop when grown near a large town, but during the last

two years prices have been very low. Lucerne, beans, mealies and potatoes are good paying crops, but lucerne is being somewhat overdone, and unless grown to feed cattle or ostriches on the farm, will have a great slump in price within the next few years.

The value of crops may be taken roughly as follows: —

Class of Crop.	Seed for Sowing.	Yield per Acre.	Approximate value per acre.
Wheat	2 bushels	25 to 30 bushels	£9
Barley	3 "	30 to 35 "	£5
Oats	4 "	25 to 35 "	£6
Lucerne (five cuttings)	28 lbs.	6 to 10 tons	£25 to £40
Swedes	4 "	24 tons	£20 to £40
Carrots	8 "	8 "	£25 to £30
Potatoes	14 cwt.	6 "	£20 to £45
Mealies	1½ bushels	1½ to 2 tons	£10 to £14
Fruit Trees ...	...	...	£15 to £80

The duty of water is the quantity required to irrigate various crops, and a stream discharging one cubic foot per second, or 540,000 gallons per day, will irrigate from 100 to 250 acres. Unfortunately, as far as the writer is aware, no proper records have been kept in Cape Colony of the quantity required for different crops, but the following figures obtained in the Western States of America may be of use: —

	Inches in depth during crop.
Barley	12
Clover	12
Oats	15
Wheat	12 to 20
Peas	14
Onions	36
Tomatoes	24
Strawberries	27
Potatoes	12 to 30
Lucerne	20 to 30
Fruit Trees	12

The quantity of water will, however, vary with the nature of the crop, soil and climatic conditions, and last, but not least, with the skill of the person irrigating. The period of irrigation is generally spread over from 100 to 120 days in Cape Colony. The number of waterings vary considerably for different crops; vegetables, wheat and lucerne usually take the greatest, and cereals and fruit trees the least number; watering generally retards growth for a short time. The method of applying water is not always properly understood, and it may not be out of place to mention that the application of too much water is often more harmful than too little. The following experiments have been carried out at Utah (U.S.A.) experimental stations with regard to the application of water: —

	Depth of water applied in inches.		Yield in bushels per acre.
Wheat	5	produced	33
	10	"	40
	more than 20	"	no increase.

	Depth of water applied in inches		Yield in bushels per acre
Oats	5	produced	58
	10	"	Same amount but increased the weight of straw.
	15	produced	70
	20	"	86
	30	"	82
	Over 30		diminished the yield.
Potatoes	7½	produced	160
	15	"	233
	30	"	274
	71	"	315

Potatoes appear to increase in yield by increased applications up to the practical limit.

The first application of water is usually the most important as regards yield, for instance, with wheat, the

First 5	inches	produced	33	bushels, or	6·6	bushels	per inch	of water.
15	do.	do.	40	do.	3·2	do.	do.	do.
20	do.	do.	40	do.	2·0	do.	do.	do.

Plants absorb and transpire more water than they are usually credited with. An acre of wheat transpired in three months and eighteen days the astonishing amount of 335¼ tons of water. A sunflower transpired 29 ozs. of water per day; a primrose transpired 11 ozs. of water per day; a geranium transpired 1¾ ozs. per square inch of plant in three months, or from 100 roots, 18 cwts. in the same time; a cabbage transpired 12 ozs. of water per day; a barley plant, during a growth of 172 days, acquired 419 grains of dry organic and 46 grains of mineral matter, and evaporated no less than 17 lbs. of water, or one grain of dry matter for every 257 grains of water absorbed.

Government Loans for Irrigation.

Loans for Irrigation Works are granted under the following conditions: —

(1) Security offered by a private owner to be a mortgage on immovable property.
(2) When loan does not exceed £500.
A. The amount of the loan, plus existing mortgages, must be under three-fourths the Divisional Valuation.
B. The Minister of Public Works may require a Valuation by two Sworn Appraisers instead of the Divisional Council Valuation.
C. If the enhanced value of the lands are taken into consideration, approved plans and specifications are necessary, and the loan, with existing mortgages, shall not exceed two-thirds of the valuation.

Loans exceeding £500 and up to £25,000.—When the application for a loan exceeds £500, or the enhanced value of the work is taken into consideration, the Director is called upon to report to the Minister that the applicant proposes to construct the works in a sufficiently substantial and durable manner, and in accordance with plans, estimates and specifications approved by him.

Loans exceeding £25,000.—If the loan exceeds £25,000, and is for a longer period than 30 years, the previous sanction of Parliament is necessary, and the plans, etc., must be approved by the Director of Irrigation.

For Pumping Machinery the loan would be given for from 10 to 15 years; 50 years would only be given for permanent works, such as dams, weirs, earthworks, canals, etc.

The following table shews the annual sum payable in half-yearly moieties required to pay off a loan of £100 with interest at $3\frac{1}{2}$ per cent.

Period of loan in years.	Annual sum to be Repaid for Redemption and Interest. £	s.	d.
5	21	19	7
10	11	18	10
15	8	18	7
20	6	19	11
25	6	0	9
30	5	8	3
35	4	19	7
40	4	13	4

EXPERIMENT STATION REPORTS.

ROBERTSON EXPERIMENTS.—No. 4.

By Eric A. Nobbs, Ph.D., B.Sc., Agricultural Assistant.

Manurial Experiments with Cereals.

The chief end of all agricultural experiments being the increase of the profits of farming and the most obvious method of so doing being to increase the fecundity of the soil, it is only natural that at the Government experiment stations one of the first and chief considerations should be an enquiry as to the suitability of certain fertilisers to the crops commonly grown and to the soil in question Whether the cultivation of the common winter cereals, wheat, oats, barley and rye, is the most remunerative or appropriate to the economic conditions of the Robertson district with its good soil and elaborate irrigation system is an open question; but the practice being general it becomes imperative to make the most possible out of the familiar crops and to get as good returns as possible from them. One of the main factors in determining the site of the experiment station was this, that, while fairly representative of considerable tracts of cultivated land it was also known as having been long under ruthless treatment, hired from year to year, grain crop after grain crop taken out and no compensatory fertiliser applied. In this respect it was an extreme example of a condition towards which much land in the vicinity is tending, hence by ascertaining the proper remedial measures, the slow but sure deterioration of the soil may be averted and its fertility conserved and augmented.

There was no record of previous experiment to guide the work, indeed the use of artificial manures is but little if at all known. The problem had therefore to be considered *ab initio*. The chemical and physical composition of the soil was unknown at the time of the initiation of the experiments. This has, through the courtesy of the Senior Analyst, been only lately obtained and is herewith published for the first time:—

Soil B.	
Water	·95
Organic Matter	2·98
Lime	·2716
Potash	·091
Phosphoric Oxide	·033
Nitrogen	·07
Chlorine	·0099

These determinations were made by extraction with strong acid, in accordance with past practice of the Government Laboratory, and indicate the total and not only the immediately available salts. The process of ascertaining with exactitude the best manurial applications will necessarily take several seasons. The process is a gradual one commencing with a large number of possibilities which by a process of selection and elimination are gradually reduced in number and increased in precision till a standard optimum dressing is realised. The results of the first season's investigations must only be regarded as tentative and preliminary. The questions asked of the soil with respect to each crop were the following: —

1. What plant food is it necessary artificially to add?
2. In what form is this to be given with the best advantage?
3. In what proportions and combinations are they to be applied?

The soil was known to be well supplied with lime, a fact verified by the analysis. There remain to be considered the three essential constituents of plant food, phosphoric acid, nitrogen, and potash. Each was applied alone and in combination with the others. Further, all these three essentials are contained in stable or kraal manure, in guano and in the complete artificial mixtures sold by merchants as "grain fertilisers." But whether these contained them in the proper proportions and best forms remained to be seen. These enquiries demanded eighteen separate plots for their elucidation, and as the total amount to be applied was quite uncertain, each combination had to be applied in three different quantities or doses. This gave 54 plots for each of the four cereals and with other subsidiary enquiries occasioned the treatment of 232 plots. The facts ascertained last year have so far cleared away the uncertainty that next year's enquiries will require less than half these plots of which a large number are intended merely to verify or check results gained to date. For the encouragement of those who contemplate experimenting on their own behalf it is as well to explain at once that for private purposes a very much simpler process than that here described should suffice. The lightest application has been termed the normal, and further doses equal to one and a half times and double that have been given. The following are the particulars of the ingredients used: —

Fertiliser.	Approximate Price per 100 lbs	Composition. Phosphoric Acid.	Potash.	Nitrogen.	Normal Quantity.
Superphosphates	4/9	19%	...	...	100 lbs.
Basic Slag	4/6	17%	..	...	100 „
Nitrate of Soda	16/10	...	...	16%	80 „
Sulphate of Potash ...	14/9	...	51%	...	40 „
Government Guano ...	6/	9	1	9	100 „
Proprietary Fertilisers A ...	8/	...	...	...	100 „
„ „ B ...	8/6	11	2	4	100 „
„ „ C ...	7/3	6	...	1·6	100 „

The analysis of the proprietary fertilisers marked C was not supplied in such a form as to be comparable to the others nor even was it properly intelligible. Nitrogen was given as "equal to sulphate of ammonia 8 to 10 per cent." This is really equivalent to but 1·6 per cent. of nitrogen, though the uninitiated is apt to construe it otherwise. Potash as such is

not given, but merely "Potash Soda and Magnesia 11 to 13 per cent.," which is no guide and very misleading. It will be noticed that the normal mixture made at the experiment station consisting of combinations of three of the four items totals 220 lbs. per acre, and is therefore to be compared to results secured with 2-normal of the proprietary manures. In the light of information now gained these have been modified for next season's work.

The results now published, conclusive so far as they go, are not to be regarded as finite but merely as a first step, important if halting, indicating the direction of further progress, though not at one stride advancing from ignorance to certainty. The intention was not so much to devise ideal recipes for manuring different crops as rather to learn the tendency and influence of the various fertilisers available to farmers in this Colony and to ascertain our needs for these different materials. For this reason complete and elaborate tables are not published but merely extracts demonstrating ascertained facts. The conclusions are briefly stated, leaving it to such as are intelligently interested to adapt them to their own needs and circumstances. Excessive detail at this early stage in the enquiry would only lead to confusion.

No two farms are identical, no two patches of soil exactly alike. It is not likely that the minutiæ of these experiments will be suited to other cases, but the broad principles hold good, and much may be learnt from the experience of the experiment station, especially by those who having visited it and traversed the ground can compare it with their own lands.

In considering the figures given below it is then to be borne in mind that these are only first approximations, expressing tendencies but by no means laying down hard and fast formulæ, and that it is the methods and principles, not the details, that will guide others in answering similar enquiries on their own soil.

The soils allocated for these experiments were as uniform as could be arranged, and the growth and treatment normal. The land was softened by a preparatory wetting of 4·27 inches applied on June 3rd, and the ploughing was completed on the 7th June; the fertilisers were sown on each plot broadcast by hand on the 13th and the seed with a broadcasting machine on the 16th. A first wetting of 5·425 inches was given on 27th August, another of 4·372 inches on 2nd October, and rains obviated the necessity of a third. The crop ripened with a total watering of 16·737 inches or 60,755 cubic feet per acre.

Wheat.

The wheat was treated as above detailed. The kind used was Rietti, imported direct from Italy and sown at the rate of 61 lbs. per acre. The crop was fair; that on the unmanured plots poor, while on heavily dressed plots the growth was luxuriant and as heavy as the land could carry. Wet did some damage about harvest time, but not uniformly, rendering some plots nugatory and unreliable. These figures had to be eliminated. A proportion of such accidents, however regrettable, is unavoidable, and fortunately did not in this instance affect the main issues.

Quantities Applied.—The 1½-normal dressing gave throughout better results than the normal and also frequently surpassed the 2-normal, indicating that the limits of practical fertilising for wheat had been reached. Especially is this the case as regards grain, the heaviest dressing having apparently led to luxuriance of stem and flag at the cost of grain and ear. With an oathay crop this is permissible, but in the case of the other cereals the grain is the prime consideration.

The Requirements of Wheat.—The figures for the 1½-normal dressing are as follows: —

Application.	Return in Pounds per Acre.	
	Total.	Grain.
Phosphoric Acid, Potash, Nitrogen	4,910	1,570
Phosphoric Acid, Nitrogen	3,000	1,100
Phosphoric Acid, Potash	4,120	1,530
Nitrogen...	1,930	1,060
Potash	1,440	540
Phosphoric Acid	1,550	560
Nil	1,320	400

Singly, the three chief plant foods are but little value though apparently nitrogen has enabled the plant to make wider use of the material already present in the soil. When combined, the value of the fertilisers is greatly enhanced especially when all three ingredients are together, although in this instance the excess of straw and chaff already appears.

Nitrogen Alone.—80 lbs. of nitrate alone almost doubles the crop, but 1½-normal and 2-normal doses only maintain a proportionate increase, hence the normal dose appears to approximate to the optimum. This was also the case with oats.

Potash alone.—Potash exerts a remarkable influence alone, the yield being in every case below that of the control plots, yet it appears to thoroughly justify its use when combined with phosphates and nitrate.

Phosphoric Acid alone.—Even phosphates applied alone to wheat are of little effect. Their use by themselves is a very common practice. The results of adding, with the phosphates, potash and nitrates to the soil are so striking that they deserve very serious attention by farmers who in the past have been giving to their land a one-sided treatment of slag or superphosphates only. The principle is here demonstrated: the applicability of the lesson can only be ascertained by experiment in every separate instance.

Phosphoric Acid and Nitrogen.—This combination at once had a marked effect, but the ratio of straw to grain was excessive, as high as 3·1 : 1, and the quality of the corn poor.

Phosphoric Acid and Potash.—On the other hand, superphosphates and potash gave a lighter total weight, but a much higher proportion of grain, than in the above cases.

Phosphoric Acid, Nitrogen, and Potash.—A truly surprising increase in yield marks the combination of all three plant foods on the one plot of wheat.

Application.	Return per Acre.		
	Total Crop.	Grain.	Yield for 1.
Normal	3,760	775	12·7
1½ "	4,910	1,570	26·2
2 "	5,215	1,545	25·7
Nil	1,320	400	6·6

The straw is somewhat too abundant, and the increase in the heaviest dressing is altogether one of straw, showing that the proportion of phosphates might with advantage be raised, and that the 1½-normal is about

a proper dressing in this case. The need of an all-round fertiliser is thus made evident. Phosphates have to be added in considerable quantity to exert an influence, while the complete grain fertilisers showed evidence to too much nitrogenous manure.

Which form of Phosphates?—Superphosphates show markedly their superiority over basic slag, a fact attributable probably to the physical nature of the soil. For simplicity grain and straw are taken together, and the figures taken only from the normal plots, with which the others agree.

Application. Phosphoric Acid in the form of	Crop in Pounds per Acre. Grain and Straw. Superphosphates and	Basic Slag.
Phosphoric Acid, Potash, Nitrogen	3,760	1,920
Phosphoric Acid, Potash	2,330	1,180
Phosphoric Acid, Nitrogen	2,850	1,780
Phosphoric Acid	1,500	1,210

It must not be rashly inferred that slag is always inferior to superphosphates. This is a point which must be decided in every case on its own merits, preferably by simple trials of the two.

Complete Manures compared.—The comparison of the prepared prescription with the natural all-round fertilisers, guano and stable manure, and with ready-made artificial mixtures of guaranteed composition, is instructive.

Application.	Crop in Pounds per Acre. Normal.		1½ Normal.		2 Normal.	
	Total Crop.	Grain.	Total Crop.	Grain.	Total Crop.	Grain.
Superphosphates, Sulphate of Potash, Nitrate of Soda	3,760	775	4,910	1,570	5,215	1,545
Basic Slag, Sulphate of Potash, Nitrate of Soda	1,920	...	1,610	820	1,790	305
Rock Guano	1,460	525	2,000	570	1,810	420
Ordinary Guano	1,875	630	2,100	690	1,970	650
Stable Manure	2,100	640	2,240	480	1,410	350
Proprietary A	1,320	495	1,380	500	1,155	415
„ B	1,340	450	1,540	440	1,350	455
„ C	1,220	380	1,020	450	1,780	460
Nil	1,320	400	...	...	...	...

In no instance do the proprietary or manufactured manures appear to advantage. This is somewhat remarkable, as these are well-known brands, the composition of which is guaranteed and believed to be suitable for the purpose intended. As the application increases, the tendency for the proportion of grain to straw to diminish is also very evident. Though the crop is somewhat heavier, the same two facts are noticeable also in the cases of stable manure and guano, indeed, with the double normal doses, an actual diminution appears to have occurred, while the rankness of the straw is very decided.

The combination of superphosphates, sulphate of potash, and nitrate of soda seems very well suited to the wants of the case. The double normal dressing shows strawiness, while the rate of gain, which, as between normal and 1½-normal, is 1,150 lbs., is reduced as between 1½-normal and 2-normal to but 305 lbs., an amount not compensating for the additional

fertiliser used. A conclusion which may fairly be drawn is that the most profitable manure is to be obtained by buying the several ingredients and combining them in such proportion as by experiment and experience may be found to answer best. An approximately suitable preparation has been devised; it remains, however, to further test this, and to alter, and if possible improve, the proportions of the ingredients used.

BARLEY.

The Robertson district is noted for its barley, and is one of the few parts of the Colony where the grain has been grown of a quality suitable for malting purposes. Only the best, however, goes to the brewer. There is much to be gained if barley of the best quality can be produced in larger quantities, and one means of attaining both ends simultaneously is by the judicious use of fertilisers. There is, therefore, a special inducement in this instance. The ordinary boer barley, six rowed, is the kind grown. The seed used in these experiments was obtained locally, and was sown at the rate of 90 lbs. per acre. The application of artificial fertilisers has proved a very profitable matter. Thus the use of 220 lbs. of the complete fertiliser, prepared for the experiments, as distinct from the proprietary bought preparations, gave a net profit over and above its cost of £3 3s. 10d., as compared to the results of the control plot, for an outlay of £1 4s. 4½d. per acre. 200 lbs. of guano, costing 12s. per acre, left a clear balance over that of the control plot of £1 18s. 2d.

Nitrogen.—Supplied alone, 120 lbs. of nitrate of soda is as effective as 160 lbs., indicating that the lesser quantity has enabled the crop fully to utilise what available plant food may naturally be present in the soil, but heavier applications are justified when used along with phosphates and sulphate of potash.

Potash.—Alone potash was of no effect, yet when added to either phosphates or to phosphates with nitrate of soda, it caused considerable increase over these dressings without potash.

Phosphates and its forms.—Similarly phosphates alone, though augmenting the crop somewhat, cannot exert its fullest influence except when allied with potash and nitrates. As before, superphosphates are invariably better than the corresponding plot in which basic slag is used. Combined phosphates with nitrate of soda, or phosphates with potash, give marked increases, and when threshed it is instructive to note that in every instance the former combination gave more straw than grain, while in the latter these proportions were reversed.

Complete Manure.—Again the combination of superphosphates, sulphate of potash, and nitrate of soda has given by far the best results; the same formula, but with basic slag, was also effective, though less so.

Guano proved superior to stable manure.

Application.	Crop in Lbs. per Acre.	
	Total Crop.	Grain.
Superphosphates, Sulphate of Potash, Nitrate of Soda ...	4,380	1,760
220 lbs. Basic Slag, Sulphate of Potash, Nitrate of Soda ...	3,740	1,480
220 lbs. Rock Guano	2,690	1,340
200 lbs. Ordinary Guano	2,520	1,200
— Stable Manure	2,080	1,045
200 lbs. Proprietary Fertiliser, A	2,670	1,000
" " " B	1,450	650
" " " C	1,340	700
Nil	1,340	780

Rye.

Good Colonial seed was sown, as already detailed, and at the rate of 75 lbs. per acre. The crop was a fair one all round, and the quality a good average.

Quantities applied.—Rye is well known as the cereal for sandy soils, particularly poor sands, hence the relatively high figure for the average of unmanured plots, the so-called control plot, a total of 1,635 lbs. per acre, of which 565 was grain. Rye is, however, responsive to liberal treatment, and has given the most pronounced results with the heaviest dressings.

The requirements of Rye.—The results obtained from the 2-normal application are accordingly given:—

Plant Food Supplied.	Return in Lbs. per Acre.	
	Total Crop.	Grain.
Phosphoric Acid, Nitrogen, Potash...	3,900	1,260
Phosphoric Acid, Nitrogen	4,860	1,310
Phosphoric Acid, Potash	2,220	520
Phosphoric Acid	1,430	540
Nitrogen...	1,980	600
Potash	1,350	500
Nil	1,635	565

Constituents used singly.—The addition of nitrate of soda at once enabled rye to increase its return, but phosphates and potash alone are without effect. The fact that the actual figures are below those of the control crop does not imply prejudicial action, but merely absence of gain; the control plot is an average of plots, whereas of the manured plots there were only single examples in each case.

Combinations.—The gain when the two are brought together is at once apparent, as also when phosphates and nitrate of soda are united, this combination giving the highest returns of any. The actual figures, with their apparent discrepancies, must not be taken literally, but rather the tendency observed and remembered. Potash appears of little if any value, not increasing the yield as compared to the corresponding plot, from which it is omitted. Yet, knowing it to be an essential plant food with which the soil is not naturally over well supplied, its continued use in moderation on this crop is to be advocated.

Which form of Phosphates?—Applied alone to the soil, superphosphates in all three doses did better than basic slag. As before, taking the 2-normal application, the verdict in favour of superphosphates is clear.

Plant Food Supplied.	Return in Pounds per Acre.	
In the form of	Superphosphates	and Basic Slag.
Phosphoric Acid, Potash, Nitrogen	3,900	3,860
Phosphoric Acid, Potash	2,220	2,160
Phosphoric Acid, Nitrogen	4,860	2,165
Phosphoric Acid alone	1,430	1,000

Complete Manures Compared.

Application.	Crop in Lbs. per Acre.	
	Total Crop.	Grain.
Superphosphates, Sulphate of Potash, Nitrate of Soda, 220 lbs.	3,100	1,400
Basic Slag, Sulphate of Potash, Nitrate of Soda, 220 lbs.	3,260	1,000
Rock Guano, 200 lbs.	1,230	450
Ordinary Guano, 200 lbs.	1,830	680
Stable Manure	1,280	500
Proprietary A, 220 lbs.	2,600	910
„ B, 220 lbs.	2,730	970
„ C, 220 lbs.	2,790	990
Nil	1,320	400

Stable manure and Government guano show but little advantage, whereas complete artificial fertilisers more than double the crop in every instance. Such decided contrasts cannot be gainsaid. The three ready-made complete fertilisers are not dissimilar, and approach the "home-made" mixture, in which phosphoric acid was given in the form of basic slag. This combination of plant foods, using superphosphate, gives a largely increased yield over all the others, no less than 2½ times that of the control plot.

OATS.

In growing a crop of oathay other considerations arise as compared to crops in which ripe grain is the aim. Abundance of foliage, fine straw, and a large weight per acre are required. In this case the commercial aspects of the question are given prominence, and a basis of 3s. 6d. per 100 lbs. for oathay assumed.

Application.	Crop in Lbs. per Acre.	
	Phosphoric Acid in the form of Superphosphate and Basic Slag.	
Phosphoric Acid, Potash, Nitrogen, Normal ..	5,740	3,880
1½, „ ...	7,510	5,755
2, „ ..	8,400	5,676
Phosphoric Acid, Potash, Normal ..	2,930	2,740
1½, „ ..	2,710	2,050
2, „ ...	3,095	2,680
Phosphoric Acid, Nitrogen, Normal ...	3,255	2,800
1½, „ ...	3,385	3,230
2, „ ...	4,170	3,800
Phosphoric Acid alone, Normal ...	1,485	1,080
1½, „ ...	1,510	1,270
2, „ ...	1,640	1,555
Potash alone, Normal ...	1,320	
1½, „ ...	1,160	
2, „ ...	1,295	
Nitrogen alone, Normal ...	2,670	
1½, „ ...	2,420	
2, „ ...	3,240	
No Manure	1,395	

In the above table the noticeable feature prominently brought forward is the effect of nitrate of soda. Alone it doubled the crop; added to phosphates it trebled the crop, though phosphates alone exerted little or no effect. Superphosphates with potash gave a good increase, but when nitrate of soda was added, the return was again more than doubled. Nitrogen has paid handsomely in each instance. These differences now recorded in figures were very clearly evident on the growing crops.

Phosphoric Acid alone.—Deficient, as the soil has been shown by chemical analysis to be, as regards phosphates, yet the simple addition of phosphoric acid, though increasing the crop, has not proved profitable.

Superphosphates.	Cost.	Increased Yield.	Increased Profit at 3/6 per 100 lbs.
100 lbs.	4/9	90 lbs.	3/2
150 „	7/1½	115 „	4/7
200 „	9/6	245 „	8/7

There is an increase in the crop, but not sufficient to pay for the fertiliser, hence the result is a financial loss in every instance. This is an excellent example of the danger of being guided purely by the results of the laboratory, unsupported by field experiments or of field comparisons, without regard to cost, which is the final determining factor in all questions of this sort.

Potash.—Potash alone gave in each instance results below even that of no manure, but the addition of potash to the phosphates increases the crop at once.

Superphosphates and Potash.		Cost together.	Increased Yield.	Increased Profit at 3/6 per 100 lbs.
100 lbs.	40 lbs.	10/6½	1.535 lbs.	53/8
150 „	60 „	15/10	1,315 „	46/
200 „	80 „	21/1	1,700 „	59/6

The combination of phosphates and potash yields a handsome return on the investment, though when used separately each is unprofitable.

Phosphoric Acid and Nitrogen.

Superphosphates and Nitrate of Soda.		Cost together.	Increased Yield.	Increased Profit at 3/6 per 100 lbs.
100 lbs.	80 lbs.	18/1	1,860 lbs.	65/-
150 „	120 „	27/1½	1,990 „	69/8
200 „	160 „	36/2	2,775 „	67/-

This combination is, therefore, also remunerative.

Superphosphates or Basic Slag.—The first table has been so prepared as to facilitate the demonstration of the fact that superphosphates have in every instance done better than basic slag. On other soils a few miles away the reverse conditions hold good, but there is no doubt as to which is the more suitable to use at the Experimental Station.

Phosphoric Acid, Potash, and Nitrogen.—It now remains to see the effect of a complete manure consisting of superphosphates, potash, and nitrate of soda. In the proportions previously given separately:—

	Cost.	Increased Yield.	Increased Profit at 3/6 per 100 lbs.
Normal Complete Fertiliser ...	24/4½	4,345 lbs.	152/3
1½ " " " ...	35/10	6,115 "	214/6
2 " " " ...	48/9	7,005 "	245/2

The use of the complete manure is highly advantageous, giving as it does a return of no less than 6½ times that of the land with no fertiliser.

These results are the more remarkable when it is remembered that this ground has for some thirty years been continuously cropped without manures, and the adjacent land is still so treated.

Complete Manures Compared.

Application.	Normal.	1½ Normal.	2 Normal.
Superphosphates, Potash, Nitrogen	4,790	5,990	8,400
Slag, Potash, Nitrogen	3,880	5,755	5,675
Rock Guano	2,885	2,235	1,830
Ordinary Guano	3,170	1,710	2,290
Stable Manure (*a*)	2,690	2,430	2,000
Stable Manure (*b*)	4,450	3,000	3,950
A.	2,630	1,235	2,350
B.	3,030	2,410	2,840
C.	2,470	2,240	2,660

The comparison of a series of complete fertilisers, as might indeed be expected, is less striking than the omission experiments just dealt with, yet the general tendency cannot be mistaken. By far the heaviest crops have been secured by the use of a preparation mixed on the farm from ingredients readily purchaseable. The cost, compared to that of other fertilisers, is as follows, taking in each case as an example nearly equal quantities of fertiliser:—

	Cost.	Increased Yield.	Increased Profit at 3/6 per 100 lbs.
Mixture using Superphosphate, 220 lbs. ...	24/4½	3,445 lbs.	120/7
" " Basic Slag, 220 lbs.	24/1½	2,535 ..	88/8½
" " Gov. Rock Guano, 200 lbs. ...	12/6	485 ..	16/11½
" " Gov. Ordinary Guano, 220 lbs.	12/-	945 "	32/3
" " Proprietary Fertiliser A, 200 lbs.	16/-	1,005 "	31/6
" " " " B, "	17/-	1,495 "	52/5
" " " " C, "	14/6	1,315 "	46/-

From these experiments with oats it is evident that the plant food originally present in the soil was altogether inadequate to meet the require-

ments of a full crop, as is shown by the fact that a heavy dressing, consisting of:

200 lbs. of superphosphates, containing 38 lbs. phosphoric acid,
160 lbs. of nitrate of soda, containing 26 lbs. nitrogen,
80 lbs. of sulphate of potash, containing 40½ lbs. potash,

gave a crop of 624·53 per cent. heavier than that of the average of unmanured land, and a money return of over 500 per cent. on that invested in fertilisers. A yield of 1,345 lbs. of oathay per acre was all that the unfertilised land could give, whereas the crop from the:

(1) Complete heavy (double normal) application	was	8,400 lbs.
(2) a heavy dressing (1½-normal)	,,	,,	5,990 ,,
,, and a moderate one (normal)	,,	,,	4,790 ,,

Without doubt there are large areas all over the Colony where, in a greater or less degree, these truths hold good, and where much benefit would result from the use of artificial fertilisers, but the first step must be that of experiment, not necessarily as complex as these here reported, but, however simple, carefully arranged and watched, and conscientiously carried out.

ROBERTSON EXPERIMENTS.—No. 5.

Varieties of Wheats.

It must be granted at once that the Robertson district is not a wheat country, and with land so dear and the possibility of growing more remunerative crops, wheat is somewhat out of place. The lack of another station more naturally adapted for wheat culture, and the existence at the Experiment Station of facilities for carrying on the work, justified the appropriation of a certain amount of land to the purpose of a comparative trial of varieties and attempts to produce new sorts. Moreover, wheat is largely grown in Robertson, however questionable the practise may appear. Some sixty-four samples of wheat were tried, with a view to comparing together their qualities, especially to ascertain their relative rust resistance. Nothing is to be gained by detailing every case, but the following notes may be of interest to wheat growers. The treatment of all the plots was in every instance the same, and all were sowed on the 2nd July, 1906, and irrigated alike, and harvested as they ripened towards the close of the year. The plots were in many cases very small, and not of equal size, so that yields per acre were not practicable last year. Birds did an amazing amount of mischief, and were so plentiful and bold that they could by no means be prevented from injuring the sprouting wheat and the ripening grain, rendering for this reason also any comparison of the returns unfair. The majority of wheats were Cape varieties, but a number of imported sorts recommended for trial were also grown. The feature of the experiment has been the success of the four Australian wheats, hybrids produced by the late Mr. Farrar, which have all come out together at the top better than any other varieties, including such old tried favourites as Du Toit, Rietti, and Golden Ball. These conclusions fully bear out the results of the several hundred trials conducted on all farms over the Colony during the past season, and recently reported upon. On *Darling* wheat, which in many cases suffered from rust, only with difficulty could traces of the disease be found, while numerous plots of other sorts adjacent were more or less severely attacked. This wheat gave quite the heaviest yield of any, bearing fine

large beardless ears, filled with a beautiful sample of grain. *Jonathan* was a very good second, with perhaps more signs of rust, but in spite of it an excellent crop. The power of yielding a good crop, even though attacked, is a better indication of resistance to the disease than complete freedom, which might be due to absence of infection, and not to natural immunity. Such is not the case in the trials under report, for all the crops were equally exposed to attacks, and adjacent plots showed very different measures of resistance, which can only be attributed to their innate properties. *Gluyas Early* has done exceedingly well all over the country, and at Robertson justified its reputation, though apparently less drought withstanding than those already mentioned, as the heads were somewhat short and not up to the standard to which it has attained elsewhere. It was a little attacked by rust as was Darling wheat. Of *Budds Early* the same is true, but this variety suffered more severely than the others from the depredations of small birds, although such grain as was secured was of very superior quality. *Elephant* wheat has, as is usually the case in Karoo regions, done remarkably well, though the birds played havoc with it. Careful examination failed at any time to find any sign of rust upon it. Several samples of *Rietti*, from different sources, were tried. For practical purposes the crop would be passed as healthy, but close inspection showed in each instance slight traces of rust fungus. The grain was, however, all good and sound, and showed no signs of having been injured from this cause. *Rooi Baard* wheat perhaps ranked next. It is a first-class wheat, very nearly free from rust, with long red ears and a black and white strong beard. *Golden Ball* wheat proved quite free from rust, and yielded an excellent sample of grain, as it always has been known to do. Closely similar in type to the last two mentioned, and also free from rust, were samples of Zwart Baard, Medeah, and Bengal (Alcaster). Several others, while free from rust, were much below the above-named varieties in the quality of grain. This may be in part due to the inability to withstand drought, as latterly water was scarce, but since all were alike subjected to this hardship, the value of the comparison is not affected thereby. Thus, Red Egyptian, Kaffir Victoria, Tante, Italian, Blue and Square Ear wheats showed no signs of rust, but, compared to those mentioned above, these were much inferior as regards the grain and yield. The following varieties showed very slight traces of rust and yielded good grain: White Lammas, Wit Erf, White Victoria, Long Pit Victoria, Du Plessis's, whilst Van Niekerk's Spring, and Kaalkop, though likewise only little attacked, yet developed grain much inferior to the others. The season was not one to encourage the disease, hence all varieties injuriously attacked must be looked on with suspicion. The undermentioned showed moderate signs of rust, sufficient to condemn them on this account alone: White Early, Du Toit, Caledon Baard, Een Been, Roerkmaker, Wolkoorn, Bushman, Wit, and Rooi. From amongst these wheats, while growing, varieties were selected whose properties it was desired to unite by the process of cross hybridization, and a considerable number of crosses secured, the further development of which will take several seasons to complete.

ROBERTSON EXPERIMENTS.—No. 6.

Barley Varieties.

While Robertson is the centre of a district which is admittedly the only one capable of producing a fair sample of malting barley, the variety commonly grown, the Boer barley, one of the six-rowed tribe (Hordeum hexasticum), is quite unsuited to the purpose. The proper barley for malt-

ing purposes, grown in or imported into Europe in such vast quantities, is the two-row variety, of which the English Chevalier is the recognised type. Of late years a number of new forms have been introduced, and of these some of the best have been brought to Robertson and tried there. The experiments have so far only been on a small scale, owing to the limited space available. It seems clear that all the two-rowed varieties give a much lighter yield than the Cape barley grown alongside for comparison, hence, unless a material difference in value can be demonstrated by means of an enhanced price for the more suitable article, it does not seem likely that the two-row varieties, although superior, will replace the old familiar form. Five sorts of two-row barley were tried. Scottish Chieftain barley was obtained from Mr. J. H. L. Dale, Ideal Hill, Piquetberg, and to this a special interest attached is that it was grown in the Colony from imported seed. A fair crop of very nice character resulted. The remainder were all grown from imported seed. Golden Grain also did well, and yielded a particularly good sample of seed. Webbs' New Burton barley did even better; the yield was excellent and the grain beautiful. This sort has the peculiarity of shedding the awns just as the grains are maturing. Webbs' Chevalier and Kinver Chevalier, on the other hand, gave disappointing results. Further and more detailed investigation into these matters is justified by the results attained so far. Three different samples of beardless barley, so useful for green forage, were also sown. All suffered in ripening from the depredations of small birds. Seed from a farm in the Malmesbury district, and that bought from a local dealer, did fairly well, but very much better results were obtained from Webbs' beardless barley, a specially imported lot. Seed of this grain will always be difficult to grow, on account of assiduous attention paid it by birds, which refuse to be scared away from the ripening grain.

ROBERTSON EXPERIMENTS.—No. 7.

LUCERNE.

The Seed-bed.—A number of experiments with lucerne are in progress. The unique position of this crop in our farming methods entitles it to special attention. Over a wide area it is by far the most important crop, and is rapidly extending its sphere of influence. There is still a great deal which is not properly understood as regards its culture and treatment. Owing to its perennial character, the experiments will take some time to carry out. Lucerne is slow to establish itself during the first year, and the results obtained so far being only partial and from newly-sown plots, reports must be withheld till another season has passed over them. Suffice it to say that enquiries are being conducted as to the duty of water for lucerne, the best mode of its application, the use of fertilisers, and the relative merits of different varieties. Five and a half acres are under lucerne, divided into 38 plots, sown last summer (1907), and more is now being laid down by winter sowing.

Laying down land to Lucerne.—The results of one experiment may, however, be recorded. While not novel or unexpected in their conclusions, it is yet interesting to see side by side the effect of slight variations in treatment. That thorough preparation of land for lucerne is a necessity, and that it pays, is well known. The crop under report was sown on a favourable situation on red sandy Karoo soil, and good imported Provence seed was used. All plots germinated well, and were healthy throughout the experiment. The land to be prepared for lucerne was cleared of quick grass.

and all irregularities smoothed off with dam scrapers and land levellers. It was then wetted and cross-ploughed, cultivated and harrowed to kill weeds. To prepare for sowing the land was wetted with 6·57 inches of water on September 8th. In place of ploughing the land was now thoroughly stirred to a depth of 8 inches, a light harrow being attached behind to pulverise the seed-bed, with a minimum treading by the draught stock. A light roller, with again the harrow attached, was passed over to crush clods and give a fine firm seed-bed, and on this the seed was sown with hand at the rate of 26 pounds per acre. It is often noticed on newly-sown lucerne land that where the ground has been trodden smooth or pressed by some weight, the seed appears to come up thicker than elsewhere. It was desired to find out whether this was actually so, and to what extent, if any, there was an advantage, for if desirable it would be a simple matter to produce the smooth surface by rolling at some favourable stage after sowing. For this purpose a number of plots treated as above described were chosen. The first was rolled immediately after sowing, and the first two cuts yielded 1,000 lbs. and 350 lbs. respectively of hay. The second was rolled four days after sowing, when germination might be expected to have commenced. The cuttings were respectively 600 lbs. and 400 lbs. of hay. When the brairded lucerne plants had two to four leaves a third plot was rolled. The yields were 750 lbs. and 400 lbs. of hay.

The fourth plot was rolled when the young lucerne stood 3 to 4 inches high, and the crops cut were 785 lbs. and 400 lbs. of hay.

Finally, a plot not rolled after sowing gave 620 lbs and 400 lbs. of hay.

The conclusions indicated from this trial appear to be as follows:—

(1) Rolling immediately after sowing is a good practice, as the first plot gave a cutting of 1,000 lbs., against 620 lbs. for that not rolled.

(2) Rolling a few days after sowing and before the seed is up seems to be hurtful.

(3) Rolling the very young plant is also perhaps beneficial, but when done on the strongly growing young crop, had a better effect than on the very young plant, hence rolling may be recommended immediately after sowing or when the young crop is well up.

(4) The beneficial effect of this process was only temporary, as in the later cutting—a very light one owing to the dry season—there is an obvious tendency for the crops to equalise.

Transient though the benefit is, it is none the less to be recommended, as anything which will assist the establishment of the young plant and its successful start is to be welcomed, and the increased first cutting is merely an indication of this vigorous start.

ROBERTSON EXPERIMENTS.—No. 8

POTATOES—SIZE OF SEED—DRILLS.

The question of the best way to plant potatoes constantly recurs, and deserves special attention on account of the fact that seed potatoes have so frequently to be imported at high prices, so that any economy that can be suggested in its use is a matter of the highest importance to the grower. Size of sets, espacement, depth and planting in drills or on the flat, each admit of separate enquiry, and combinations of these methods will lead to

very different final results as regards not only the crop lifted, but also the proportion of ware or saleable potatoes to seed, so-called, and to chits or rubbish, which includes diseased, malformed and small tubers.

Size of Sets.—For this comparison five small plots were required. In the first two whole tubers were planted, moderately large ones, averaging three ounces apiece, in the one plot, small ones, averaging one and a quarter ounces each, on the other. On the remaining three plots the seed was cut in two lengthwise, to ensure that each tuber should contain part of the rose end, the pieces on each plot averaging respectively $\frac{3}{4}$, $1\frac{1}{2}$, and $2\frac{1}{4}$ ounces. The seed used was all Early Rose. The conclusion is manifestly in favour of the small tuber, planted whole, which yielded 4,860 lbs., against 4,240 lbs. for the larger whole sets. The seed and chits were about equal, the gain being almost entirely in marketable potatoes. The largest size of cut sets ($2\frac{1}{4}$ ounces) yielded 4,280 lbs., a trifle above the last figure given, but gave a smaller proportion of ware. Pieces of $1\frac{1}{2}$ ounces gave 2,880 lbs., while the smallest pieces brought 3,980 lbs., an irregularity due, in part, to thicker planting, as in this case the proportion of chits was also the highest. The conclusions to be drawn from this experiment are in favour of small whole potatoes, failing which ordinary marketable potatoes may be cut in two, but must not then be as small as the whole potatoes used for seed. Incidentally, the advantage of using seed potatoes of an even size throughout in the production of a uniform crop may be mentioned.

In drills or on the flat.—The test of planting on drills and on the flat was combined with that of planting at different distances. It was regarded as within the bounds of possibility that at certain distances the one method might prove preferable, and other distances a different espacement, and such was to a certain extent the case. Planting on the flat is the method commonly practised, and consists in planting the sets behind the plough every second or third furrow, according to distances desired and width of the furrow slice. After planting the ground is harrowed, a process which may with advantage be repeated just as the sprouts are breaking through the surface or about to do so. The method known as planting in drills requires the use of a ridging plough, a plough, that is, with two mouldboards throwing the soil up on each side as it passes along. With this implement a series of furrows are drawn at the required planting distance. At this stage or previously stable manure or artificial fertilisers may be applied, and the sets are now laid in the open furrow. The ridging plough is then drawn between each of these open furrows, filling them up and converting them into ridges, leaving furrows between these drills. Should a crust form on the surface, the land is harrowed at the time that the potato plants are due above ground. This plan has several material advantages in working. Planting is very easy, and subsequent cultivation greatly facilitated. The horse-hoe passes along between the ridges, keeping down the weeds and loosening the surface, while later on, when the shaws are meeting and so protecting the surface and preventing weeds growing, the ridging plough is again employed to earth up the drills and cover the swelling tubers. The difficulty of leading water is overcome, as it flows along between the ridges irrigating the crop wihout compacting the soil round the neck of the plants. The first wetting may even be applied before planting along the furrows in which the sets are laid, and the moist soil is then covered up in the process of burying the seed. Finally the work of lifting the crop is much easier in land planted in ridges than on the flat. Both methods are practised in this country, but the merits of that just described do not seem to be as widely known as they deserve. Its advantages would be less noteworthy were it not for the fact brought out in the experiment that the yield is also materially enhanced by planting in drills in place of on the flat.

In connection with another enquiry, nine plots were planted each way, and the average yield is in favour of drilling by 7,741 lbs. against 5,625 lbs. This is consistently true in the case of fairly wide planting, drills 24 inches and 27 inches, where in every instance the ridged plot gives a material increase over the corresponding plot, identical in all other respects, but planted according to the other system. With very close planting, the rows only 21 inches apart, the advantage, in two cases out of three, was with the flat planting. But this is readily understood, as, with such close drills, the ridges are but small and low, and lose their distinctive character, while the concurrent advantages from cultivating, leading water, and convenience in earthing up, all of which combine to render the system advantageous, could not in such close planting come properly into play. In any case, such close planting is in itself not to be recommended, hence the final verdict must rest entirely in favour of the method of ridges.

In future experiments with potatoes, this method will be adhered to, except where purposely the other is employed.

Espacement.—In determining planting distances we have to consider the weight of the crop and the proportion of large potatoes to small, but in addition we must think of the most convenient arrangements for working the land. The quantity of seed increases very rapidly with closer planting, the nearest used in the experiments, 21 inches by 8 inches, requiring just double that of the widest, 27 inches by 12 inches. Close planting increases and in part prevents subsequent cultivation, which militates against the best development of each plant.

Apart from the two methods of planting already discussed, and remembering the advantages of convenience in subsequent operations, an examination of the accompanying table will show that planting in rows at least 27 inches wide gives quite the best results, except in the case of close planting on the flat, in which instance, however, nearly half the crop was only of seed size. The return from the plots on which so much more seed was used is necessarily large, but is by no means proportionate to the amount of seed so used.

Espacement.		Return.			
		In Ridges.		On the Flat.	
Width of Rows, In inches.	Distance of Sets, In inches.	Relative order.	Crop in pounds per acre.	Relative order.	Crop in pounds per acre.
21	8	5	6,820	1	8,830
21	10	8	6,090	5	5,180
21	12	9	4,055	3	7.270
24	8	7	6,370	4	6.020
24	10	4	7,750	8	4.500
24	12	6	6,610	7	4.510
27	8	3	9,300	...	...
27	10	2	11,415	6	4,860
27	12	1	12,255	2	7.340

The inexpedience of close planting is thus demonstrated. In further plantings even greater distances will be tried in order, if possible, to ascertain what is the best limit both as regards rows and distances in the rows. It must be remembered that the espacement most suitable to one kind of potato, in this instance Early Rose, will not be necessarily the best for some other sort such as Hanf, German Blue, or Up-to-date.

ROBERTSON EXPERIMENTS.—No. 9.

Varieties of Potatoes.

The Robertson district is justly famous for the potatoes it produces, this crop constituting one of the staple articles sent to both northern and western markets. The cultivation of the potato is, however, surrounded with many drawbacks, more particularly (1) the difficulty of storage of the main crop, maturing in the hot weather; (2) the injury caused by the "miet," or tuber moth (*Lita solanella*); (3) the attacks of certain fungoid diseases as yet uninvestigated; (4) the scarcity of water in summer; (5) the lack of varieties and difficulty in securing fresh seed.

The last-named disadvantage affords the readiest opening for enquiry with a likelihood of immediate benefits, hence this line was selected for attention in the first year of existence of the experimtntal station. The season was a rather unfortunate and peculiar one. For full four months no rain fell. Then a flood occurred, four inches of rain were registered in the station gauge in twenty-four hours, and much damage caused in the neighbourhood. Incidentally the Van Zyl canal, which supplies the station with water, was breached, and the benefit of the flood to a great extent lost. Under these circumstances good crops were not to be anticipated, relative drought resistance being probably the factor most strongly brought into evidence, and recorded in the results achieved.

The varieties tested were specially selected as deserving trial at Robertson, and chosen from trade lists of sorts recommended for South Africa. Twenty different kinds were planted under, as nearly as possible, identical conditions, and all between the 17th and 22nd of December, 1906. As stated, the results indicate mainly their respective power of withstanding drought, and it is the relative, not the actual, figures that merit attention.

The following statement gives as concisely as possible the conclusion of the test:—

1.	Beauvais Institute	4,440	lbs.	
2.	Epicure	4,100	,,	
3.	Ninety-fold	2,520	,,	
4.	Eldorado	2,325	,,	but healthy and with small proportion of small tubers.
5.	Northern Star	2,155	,,	Ditto.
6.	African Red	1,984	,,	
7.	Factor	1,527	,,	
8.	Supreme	1,500	,,	
9.	Magnum Bonum	1,200	,,	
10.	Royal Kidney	1,080	,,	
11.	White Elephant	1,080	,,	
12.	Maincrop	1,040	,,	
13.	Flourball	1,000	,,	Badly diseased.
14.	Pink Beauty of Hebron	952	,,	
15.	Reliance	620	,,	
16.	Wyatt's Ashleaf	600	,,	
17.	Abundance	280	,,	
18.	Sutton's Ashleaf	140	,,	
19.	Field Ashleaf	140	,,	Diseased.
20.	Imperator	100	,,	

The first six certainly deserve further attention, as the yield and quality under such unfavourable conditions entitle them to our careful consideration. The success of both the Eldorado and the Northern Star, the varieties which realised such exorbitant prices during the recent potato craze in England, is a noteworthy feature. Many familiar names of well-

known sorts occupy low positions in the list, such as Magnum Bonum and Maincrop and the Ashleaf varieties.

Those that have done well will be further tested along with such others as commend themselves for trial. At the present time the old local favourite, the Hanf potato and the Early Rose, are the sorts most grown, though Up-to-date is also popular. There is great need of additional sorts, particularly for the summer sowing.

Enquiries were also conducted into the questions of methods of cultivations, amount of water needed and most appropriate fertilisers, and while some progress has been made, it is not yet considered advisable to issue reports upon these matters.

ROBERTSON EXPERIMENTS.—No. 10.

THE TRIAL OF NEW CROPS.

It is safe to assume that we have by no means yet learnt to know all the crops which can be profitably cultivated on our different soils and in our great variety of climate. While the staple crops are determined and well known, there yet remain great possibilities of enhancing the profitableness of farming by the introduction of new crops not hitherto grown and of developing branches of rural industry not as yet attended to. Valuable as lucerne is, we yet need, in addition thereto, crops which will yield succulent food for stock, especially dairy cows. Of such crops a variety exist. At Robertson Experiment Station a number of these have been tested by the process of repeated sowings on small plots of one-eightieth acre in size, and the results now published show that several are deserving of most serious attention. Such will receive further experimental cultivation next season. Much yet remains to be learnt as to the most profitable treatment for them, but such enquiries necessarily follow the prime questions enquired into this year, *i.e.*, whether the crop will answer at all, and, if so, the proper season for sowing it. Owing to accidental and unavoidable circumstances these crops receive a minimum of water, and may be relied on to do very much better under more favourable circumstances another season. The following notes refer to new crops tried in the summer season, sown at intervals of about four weeks, according as the exigencies of the water supply would allow. The seed was sown on irrigable land after the removal of a cereal crop, such as oats or barley, and some provided in a remarkably short time an abundance of nutritious palatable and succulent food fit for immediate use or conservation either as silage or hay.

MILLETS AND SORGHUMS.

Planters' Friend, one of the best known forage crops of its class in Australia, has quite justified its high reputation, proving to be one of the best of all those tried. No doubt with more liberal watering the yields would have been better. In character and appearance Planters' Friend somewhat resembles Kaffir corn. It grew to a height of 5½ feet, and should be cut while still fresh and succulent. The yield of the first crop sown on 20th October and harvested on 2nd February, was 7,360 lbs. of cured hay. It was cut somewhat late, and would have furnished green feed very much earlier. Sown on the 3rd November, and cut also on 2nd February, 6,040 lbs. per acre of hay resulted, while sowings of the two subsequent months fell to 1,480 lbs. and 500 lbs. of hay respectively, owing to the lack of

water. As a rough guide, 100 lbs. of green millet make 30 lbs. of hay, hence the yields of the cured dry article represent about three times as much green fodder, and are very satisfactory indeed, and also useful for the purposes of comparison with other varieties sown simultaneously.

Our own *N'youti,* from Rhodesia, did even better, and on this account deserves close attention, as it promises to prove superior to any imported sort, especially under very dry conditions. Sown and harvested at the same dates as the last, N'youti yielded respectively crops of hay of 3,000, 8,160, 5,600 and 1,000 pounds per acre, the November sowing yielding the heaviest cutting of any crop of this character tried. As the height was only 3½ feet, it will be realised that the crop is a heavy and luxuriant one, with a large proportion of leaf; in every way a desirable crop.

Japanese Millet appears to be a remarkably rapid grower, maturing during the heat of summer in the short space of two months. The successive crops yielded 2,320, 800, 120 and 320 lbs. per acre of hay, the best crop attaining a height of only about 3 feet. It is probably not such a good drought resister as N'youti, but for a quick-growing succulent feed it is unsurpassed.

Egyptian Millet is another excellent and fast-growing crop. It grew to a height of 5 feet, dense and leafy, and should provide excellent green fodder for cattle. The yields show the lack of water, and were for the dates already given 4,400 lbs., 1,140 lbs., 2,640 lbs. and 750 lbs.

Pearl Millet is also a very promising summer fodder plant. It grew four feet high, and seems specially suited for the purposes of green forage. The first plot met with an accident, but sown on the dates already mentioned, the weights of cured hay were respectively 1,180 lbs., 1,720 lbs., 2,240 lbs. and 160 lbs. These would doubtless have been more but for the deficiency of water. In comparison to those already mentioned, the following were poor and disappointing:—*Hungarian Millet* grew 30 inches high, and yielded from the earliest sowing, October, 1,320 lbs. of hay per acre, the next 800 lbs., the next only 120 lbs., while the December sowing was ploughed in place of being reaped. *Siberian Millet* also grew about 30 inches high, was leafy and succulent so far as it went, but there was too little of it to be of any value, the four sowings yielding 280 lbs., 40 lbs., 80 lbs., and 60 lbs. of hay to the acre. *Everlasting or Aleppo Millet* was very similar, the hay crops being 600 lbs., 80 lbs., 320 lbs. and 350 lbs. for the four monthly sowings. This crop is a perennial, but must be treated with caution, as it is reputed in certain parts of the United States to have become an ungovernable weed. *Italian Millet* is also one of the short but leafy and quick maturing forms. It stools out freely. The seed could only be sown on the three latter occasions, and yielded per acre but light returns of 360 lbs., 320 lbs., and 200 lbs. of hay, which must be regarded as insufficient when compared to results with other sorts.

Yellow Millo Maize proved a very great success, and deserves a high place in our estimation. It grows like Kaffir corn, to a height of about 5½ feet, is very fast, and seems likely to yield well under adverse conditions. The four monthly sowings gave the following very satisfactory crops of cured hay, 3,160 lbs., 4,800 lbs., 3,350 lbs., and 2,000 lbs. per acre, and might with advantage have been cut somewhat earlier than was the case. *Undendibule Amber Cane*, an American variety, but procured from Australia, was very similar in growth, though a trifle shorter, and is also to be regarded as very successful, the four crops furnishing 4,120 lbs., 2,560 lbs., 3,360 lbs. and 2,440 lbs. per acre of hay. *Amber Cane.*—The same remarks apply also to this crop in every respect, the yields in this case being 5,600 lbs., 2,400 lbs., 1,800 lbs. and 1,600 lbs. of hay per acre.

The seed of the undermentioned experimental crops arrived too late for the October sowings, and were first put in on the 3rd November and reaped on the 25th January, then on the 29th November, reaped on the

10th of March, and finally on the 10th December, also reaped on the 10th of March. *Minnesota Amber Cane*, like other members of the same family, grew to a height of 5 feet, and though attacked while young by Lady-bird (*Epilachna similis*) and supplied with but little water, pulled well through, and gave crops of hay of respectively 3,440 lbs., 2,240 lbs. and 2,000 lbs. weight per acre. *Early Amber Cane* could only be sown on the two last occasions, and while similar to those above mentioned yielded smaller returns of only 1,040 and 640 lbs. per acre. *Cat Tail Millet* proved a heavy cropper, though with a preponderance of stalk over leaf. While young it was injured by the lady-bird, which accounts for the reduced returns of hay of 3,000 lbs., 1,000 lbs. and 440 lbs. per acre respectively. It stood 4½ feet high. *Early Orange Cane* only grew 2½ feet high, but matured very early, and produced a dense mass of foliage, hence is to be recommended. The three crops yielded 700 lbs., 3,040 lbs. and 2,000 lbs. per acre of hay. *Green Californian Millet* must be written down a failure as, though reaching a height of 3 feet, it was unsatisfactory in appearance, and gave only 460 lbs., 360 lbs. and 300 lbs. of hay per acre. *Manna* (from England), which very closely resembles the last, is indeed apparently the same, only succeeded in one instance when it yielded a small crop of hay of very good quality, but only weighing 440 lbs. per acre. *White French Millet* was also practically a failure, growing quickly, but giving a poor crop. Birds were inordinately fond of the ripening seed. The various crops yielded respectively 660 lbs., 240 lbs. and 200 lbs. of hay per acre. *Imphee* (from France) was short, only reaching 2½ feet in height, and cannot be called a success with 560 lbs., 720 lbs. and 500 lbs. of hay per acre for a crop. *African Early Pearl* could only be sown the last sowing, and proved somewhat stalky, but gave the fair return of 1,280 lbs. per acre, and deserves further trial before being condemned. *Everlasting Mealies*, *Extra Early Mealies*, and varieties of *Pop-Corn*, prove disappointing, but will have to be tried again before they can definitely be recommended or condemned. *Bird Seed* proved altogether a failure.

Leguminous Forage Crops.

The leguminous forage crops deserve attention, not only on account of the mass of foliage they provide suitable for green feeding, for hay, for silage, or for grazing, but also as soil improvers, adding to it a large amount of organic matter. Their penetrating roots fetch up plant food from depths beyond the reach of other crops, and leave it in their remains in the upper layers. Finally, the leguminosa collect, as is now well known, with the help of a bacterial organism, the free nitrogen from the air, utilising it themselves, and so providing this necessary element of plant food for subsequent crops. Considerable success has attended these experiments, and it is obvious that certain of these plants have a very important role to perform in the future cropping of farms in this Colony, both as valuable commercial commodities, useful fodder plants, and as important factors in the maintenance and improvement of the fertility of our soils.

Cowpeas were sown successively in October, November and December, and did well every time, though even better results would have been obtained but for the shortage of water. The green fodder was over five tons to the acre, but not being much relished by stock, the plots were allowed to ripen their seed. Coffee cowpeas developed a great mass of leaf over three feet high, healthy and luxuriant, and yielded 650 lbs. of clean seed to the acre. New Era was lower and less rank in growth, but yielded up to 960 lbs. per acre of clean seed. These two varieties will be tried at the proper season on a more extended scale, and a number of other varieties have been procured for further experiment. There are distinct types of cowpea, some erect in habit, others trailing like sweet potatoes. The relative merits of

the different sorts require careful examination. It is interesting to note that in the Zwartbek or Catjering boontje and the Kafir Bean of the north-west, we have two forms of cowpea, if not indigenous, then introduced at some very remote period, and now thoroughly acclimatised. Their merits seem hardly to have received that general appreciation they certainly deserve, but the beneficial influence of the Kaffir Bean in restoring the soil has been well-known by farmers along the Vaal and Oringe Rivers long even before the nature of this process or the action of the symbiotic bacteria was understood.

Spring Vetches did remarkably well, and furnished a large amount of green food much relished by the stock. Sown on the 6th October, vetches yielded on the 31st December a cutting of 22,840 lbs. per acre of green food. Sown on the 2nd November and cut on the 15th February, the yield was 15,460 lbs. per acre, while subsequent sowings, with very little water, brought 4,660 lbs. and 5,840 lbs. per acre. Even these latter figures are fair, while the first is to be regarded as excellent.

The *Swazi bean* was specially procured from Swaziland, where it forms an important element in the native diet. The plant is of low, inconspicuous habit, bears a small white flower, which in maturing buries itself in the soil like that of the ground nut and ripens beneath the surface. The conditions were apparently unsuitable for it, and the result is a practical failure so far, but yet this interesting plant deserves at least one further trial on a somewhat different soil.

Soy bean and *Velvet bean* arrived too late in the season for fair trial, hence judgment must in their case be suspended.

KALE AND RAPES.

Thousand-headed Kale is well known in Europe, and always regarded as one of the best green fodder crops that can be, providing as it does a luscious green feed particularly well suited for milch cows. It has amply justified its good name. The first plot was sown in October and grew somewhat slowly at first, but after fifteen weeks furnished 22,200 lbs. per acre of excellent succulent fodder. Later sowings grew faster. From seed sown in February 24,440 lbs. was cut per acre, but later sowings gave considerably less. A soft crop of this nature cannot be expected to withstand drought. *Hardy Branching Kale* is a variety of the above, and justifies its name in giving a heavier weight under favourable conditions, yielding in February 11,680 lbs. as against 3,340 lbs. per acre for the Thousand-headed variety, and in March 8,486 lbs. as against 7,580 lbs. per acre. Throughout it appeared hardier, healthier and more vigorous than the common kind.

Rape.—There are three forms of rape, Summer, Winter and Essex; the seed of the latter is dearer than the others, but in most comparative trials it has done by far better than these, and is strongly to be recommended. The other two appear much alike, and all are an excellent fodder crop for either cutting and feeding to stock in the stable (soiling), or for despasturing. It is much relished by cattle and pigs, and is being used also for ostrich feed, and had an immediate good effect on the milking capacity of cows. The crops mature, if sown at the right season, in 10 to 12 weeks. The best results were from crops sown early in October. Summer rape gave 21,360 lbs. per acre, winter rape, a first cutting, of 24,980 lbs., and a second one, 8 weeks later, of 6,400 lbs., whilst Essex yielded no less than 39,780 lbs. per acre. In February the three gave 7,120 lbs., 4,580 lbs., and 10,840 lbs., and in March 12,400 lbs., 9,930 lbs., and 11,950 lbs. each, in two cuttings. There can be no doubt of the propriety of every farmer in the course of the summer growing at least a patch of rape to maintain the flow of milk, if for no other purpose.

EXPERIMENTS WITH OSTRICHES.

IV.—THE RATE OF GROWTH OF OSTRICH FEATHERS.

By Professor J. E. Duerden, Rhodes University College, Grahamstown.

It is of importance in many ways to the ostrich farmer that he should have some knowledge of the rate at which the ostrich feather grows, particularly as it may afford him valuable information concerning the actual condition of the bird at any time, and the suitability or otherwise of the treatment to which it is subjected. In a very general way the farmer is possessed of this information. He knows that after about six months the chick feathers or spadonas will be ready for clipping, and the quills ripe for drawing two months later. Subtracted from these eight months the length of time which intervenes between the hatching of the chick and the first appearance of the spadonas, and then dividing by this the actual length of the feather and quill produced, he can obtain the average rate of growth for each day, week or month. Similarly with the adult feathers. He knows that eight or nine months at least must elapse between the drawing of one set of quills and the drawing of the next, and having observed the time at which the new feathers appear, and measured the length of the feather, he can readily ascertain the proportionate growth for each day or week.

Such a ready means, however, does not yield much detailed information; it only gives an average rate of growth, implying that the feather grows at the same rate throughout its length, which is certainly not the case, and time is also lost in the ripening of the quills. A method which I have recently devised has worked so well in practice that it is possible by means of it to determine the actual rate of growth of any feather for each day or week at any period of the feather's development. It is here given, in the hope that farmers will thereby carry on more precise researches on their own account, and find in it a means for estimating what is the actual growing condition of the feather at any time, and from this the physiological state of the bird.

A piece of strong linen thread is tied round the growing feather just where it emerges from the socket. The unopened feather is here soft and plastic, and the thread makes a small indentation. If tied too tightly the indentation will be deep, and a bar will result when the feather comes to open out at the particular place,* otherwise it scarcely injures the later growth. The free ends of the thread are cut close to the knot, and it is found as a matter of experience that the ring does not slip or become displaced by preening,† but must, of course, be cut off before the continuous

* I have employed this method in order to prove that bars can be produced artificially.

† Incidentally this proves that the ostrich does not attempt to preen its feathers in the soft growing region just above the socket; its action in this respect is limited to removing the outer feather sheath where the feather is about to open out. Many have suggested that bars may be produced by the bird preening its feathers where they are soft and plastic, but the experiments prove the bird does not attempt this. It only preens off the dried dead outer sheath.

growth brings it to the height at which the feather opens. Measuring by means of dividers the length between the ring and the mouth of the socket, one can estimate the amount which the feather has grown during the interval, maybe one or several days. If it is wished to make detailed observations upon the growth of any individual feather, the more frequently fresh rings of thread are tied the more accurately one can estimate the growth during any particular number of days. An example will best indicate the nature of the results which can be secured.

The observations were made on a chick seven months old, with all its spadonas clipped, but one socket contained a new feather about half-grown, the spadona having been trampled out long before ripe. A ring was tied just above the socket of this growing feather on the 4th May, and on the 11th of May, seven days after, it was measured, and the ring found to be $1\frac{3}{8}$ of an inch from the socket, this representing a week's growth. Another ring was then tied on the 11th, and measured on the 20th, that is, nine days after, when the growth was found to be $1\frac{3}{4}$ of an inch, which represents practically the same daily growth as the first measurement. Afterwards the rings were applied more frequently. One was tied on the 20th and measured on the 22nd, the two days giving a growth of $\frac{3}{8}$ of an inch; another from the 22nd to the 25th gave $\frac{4}{8}$ or $\frac{1}{2}$ an inch for the three days; the next from the 25th to the 29th gave $\frac{5}{8}$ for the four days, and that from the 29th May to 1st June again gave $\frac{4}{8}$ or $\frac{1}{2}$ an inch, for three days. The results can be best displayed in tabular form:—

Date.	Actual Growth.	Rate per Day.	Rate per Week.
4 to 11 May	$\frac{11}{8}$ in 7 days	·196 inch	1·37 inches
11 to 20 May	$\frac{14}{8}$ in 9 days	·194 inch	1·36 inches
20 to 22 May	$\frac{3}{8}$ in 2 days	·188 inch	1·32 inches
22 to 25 May	$\frac{4}{8}$ in 3 days	·166 inch	1·16 inches
25 to 29 May	$\frac{5}{8}$ in 4 days	·156 inch	1·09 inches
29 to 1 June	$\frac{4}{8}$ in 3 days	·166 inch	1·16 inches

For convenience in calculation all the measurements are given in eighths of an inch, this being the unit taken as sufficiently accurate for all practical purposes. The averages show a fairly uniform rate of growth, the greatest weekly variations, 1·37 and 1·09, representing less than $\frac{3}{10}$ of an inch per week. During the first part of the month the rate per week was about $1\frac{1}{3}$ inch, and during the latter part about $1\frac{1}{6}$ inch. Probably even such a small variation could be accounted for, did we know more about the physiology of the ostrich.

A second series of measurements were taken from a feather of another chick of about seven months, also with an odd feather growing while the spadona quills were ripening.

Date.	Actual Growth.	Rate per Day.	Rate per Week.
11 to 15 May	$\frac{7}{8}$ in 4 days	·219 inch	1·53 inches
15 to 20 May	$\frac{9}{8}$ in 5 days	·225 inch	1·57 inches
20 to 22 May	$\frac{4}{8}$ in 2 days	·250 inch	1·75 inches
22 to 25 May	$\frac{6}{8}$ in 3 days	·250 inch	1·75 inches
25 to 29 May	$\frac{8}{8}$ in 4 days	·250 inch	1·75 inches
29 to 1 June	$\frac{6}{8}$ in 3 days	·250 inch	1·75 inches
1 to 4 June	$\frac{7}{8}$ in 4 days	·219 inch	1·53 inches
5 to 8 June	$\frac{5}{8}$ in 3 days	·208 inch	1·46 inches
8 to 12 June	$\frac{6}{8}$ in 4 days	·188 inch	1·31 inches
12 to 15 June	$\frac{5}{8}$ in 3 days	·208 inch	1·46 inches

The results in this case are particularly interesting. The measurements from the 20th May to the 1st June show a very uniform rate of

growth of 1¾ inches per week, actually a quarter of an inch per day, which must be considered as fairly rapid, while the rate before and after this was 1½ inches per week. It may be noted that this is one of the most vigorous chicks under my charge, coming from the well-known Chance strain belonging to Mr. Alf. White, of Clifton. It is likely that some of the very long Oudtshoorn feathers will grow more than a quarter of an inch each day. The previous chick does not appear to be in the same healthy, vigorous condition, and this difference is at once shown in the difference in the rate of growth of the feather. A very important question will arise in this connection. Do the feathers of any plumage always continue their growth for the same number of weeks or months? If this be so, then a feather with a slow rate of growth will of course produce a shorter ripe feather. Points such as this can all receive an answer from the method of investigation.

The feathers of a third chick in a not very healthy condition, supposed to be affected with wire-worm, were also tested by the same method, with the following results:—

Date.	Actual Growth.	Rate per Day.	Rate per Week.
8 to 15 May	7/8 in 7 days	·125 inch	·88 inch
15 to 20 May	5/8 in 5 days	·125 inch	·88 inch
20 to 22 May	2/8 in 2 days	·125 inch	·88 inch
22 to 25 May.	4/8 in 3 days	·166 inch	1·16 inches
25 to 29 May	5/8 in 4 days	·156 inch	1·09 inches
29 to 1 June	4/8 in 3 days	·166 inch	1·16 inches
1 to 5 June	5/8 in 4 days	·156 inch	1·09 inches
5 to 8 June...	4/8 in 3 days	·166 inch	1·16 inches
8 to 12 June	5/8 in 4 days	·156 inch	1·09 inches
12 to 15 June	3/8 in 3 days	·125 inch	·88 inch

In this instance the feather was growing at the rate of less than an inch per week for part of the period, and for the remainder only a little over an inch per week. At times the rate was only half that of the White bird at its period of most rapid growth. The experiment demonstrates very clearly the possible great difference in the rate of growth of ostrich feathers, depending partly on the strain of the bird and partly on its physiological condition. In all cases the feathers were at about the middle of their total length, and were situated about the middle of the wing. It is hoped that at some time it may be possible to extend the observations so as to determine the rate of growth of the different stages of development of any one feather and also that of feathers situated on different parts of the wing. Such observations will necessitate a prolonged enquiry continued for six or seven months.

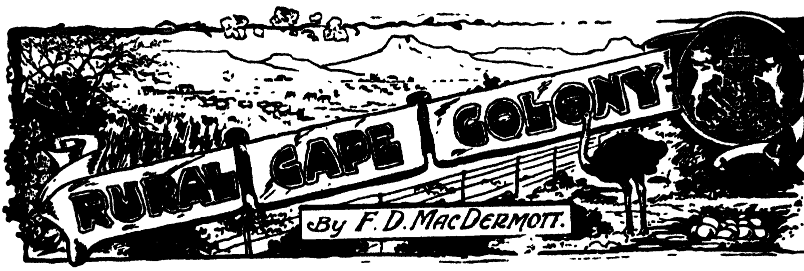
In the case of a cock bird suffering from some special trouble during the early development of its feathers, it was found that the feather growth practically stopped for a week or more; for at least seven days the feathers increased in length not more than one-eighth of an inch. On the cock recovering, growth proceeded normally. Occasionally an old feather in a wing will cease growing altogether. Under these circumstances the gradual withdrawal of the nutritive blood from the medulla or pith of the feather can be observed, just as in the ripening of a feather. All these facts bear out the results of other experiments that the growth of the ostrich feather is closely dependent upon the physiological condition of the bird, and that in order to produce the fullest and most perfect feather, the birds must be kept in a healthy, vigorous state. Further illustrations of this conclusion will be given in a later contribution.

As connected with this subject, and calling for consideration, is the fact that sometimes the appearance of the new feathers, after quilling has taken place, is delayed for long periods. Usually the new feather shows

itself just beyond the socket in about a month's time after quilling, but occasionally several months elapse, and particularly is this the case as regards single sockets, thereby leading to a loss in the number of feathers produced at a clipping.

Summary.

1. The rate of growth of ostrich feathers can be determined by tying at intervals a ring of fine thread around the growing feather at the mouth of the socket, and then measuring the distance of the ring or rings at intervals of a few days.
2. In the most vigorous birds with long plumes the wing feathers grow at least $1\frac{3}{4}$ inches per week or $\frac{1}{4}$ inch each day; in weakly birds the growth in length may be scarcely half these amounts.
3. The rate of growth varies in different ostriches, dependent upon the strain of the bird and the condition of health of the bird. Under certain conditions of health growth may cease altogether, or the appearance of new feathers may be long delayed.



No. XXVII.

ON THE ZWART KEI RIVER·

(Continued from Page 323.)

Although this article nominally deals with the District of Tarka, it will be noticed in this issue that my tracks really moved, after leaving the lower Winterberg, more along the borders of the Queenstown District. From Vogelstruis Nek, which lies just above Wheatlands, I travelled back along the road to Tarkastad until within a few miles of that town once more. On going back over the same road, which by this time was a little drier than when I made the outward journey, I had the opportunity of noting more of the peculiar features of these parts. Among them was the sharpness of the mountains, which rise here to considerable heights. For hours we seemed to be skirting the bases of two of the most prominent peaks in the section, which stand up like miniature twin Table Mountains. These two mountains must be veritable landmarks for many miles around. To the southward I was shown a path which was described as Groennek, which has the appearance of being about as steep and precipitous a bridlepath as the most venturesome could desire. It was in such fastnesses as these that the local troops had to face the enemy during the late hostilities, and the marvel is, judging by the appearance of the country, that any headway was made against them at all. But all signs and indications of the struggle which raged backwards and forwards through these now peaceful valleys, has long since disappeared, and in place of war's rude alarms one can see nothing more startling than herds of cattle, and flocks of woolled sheep scattered at fairly regular intervals, which show that the era of quietude has been taken full advantage of by the farmers.

When leaving the road, which leads direct into Tarkastad, we turned almost due east, and thus continued our course in the direction of Queenstown. Still skirting the bases of the two Table Mountains we came out through a gap on the other side of the rather steep ridge of which they formed a part. We were now descending fairly fast, and after about an hour's drive found ourselves in a wide and far reaching valley of a fairly level character, which, I was informed, stretched away towards the Queenstown District. This is the

VALLEY OF THE ZWART KEI,

through which the rest of my journey carried me exclusively. The whole face of the country seemed changed in this valley. In place of the irregularities of the hill country behind us we were now in undulating grass lands, with thorn bush on the lower ranges of the hills in the distance. To the south was still to be seen the Great Winterberg with its frowning heights and towering ranges, and in the foreground stood the Little Winterberg, a spur of which formed the enormous ridge which jutted out and ended in the two table mountains mentioned previously. It is through this wide valley that the Zwart Kei flows down from the landward side of the mountains, which stand like a breastwork above the coast line on the other side. The river itself, though deriving its principal waters from these mountains, which in turn gather their moisture from the air currents floating up from the sea on the other side, runs for many miles direct inland in an almost northerly direction. From Ruitjes Flats, at the top of the Winterberg, it is a long journey to Klein Haasfontein, on the borders of the Queenstown district, and this is the track which the river takes before it begins to turn back towards the sea. From Klein Haasfontein, or Waverley as it is now called since the advent of the railway, the river makes a grand detour in the direction of Whittlesea. Some miles before that centre is reached, it turns off again and flows into the Great Kei, near Tylden, below Queenstown. Not far from Whittlesea it is joined by another remarkable stream, which flows down from the Katberg in the same manner as the Zwart Kei, and thus the irrigators along these rivers are using flood waters from rains which have fallen many miles above them. The latter river is known as the Klipplaat, and is a source of much fertility in the valleys through which it flows till its junction with the Zwart Kei. I mention these few details to show the general physical features of the country about here where irrigation is the useful servant of the farmers, though in normal seasons the rainfall is fairly sufficient for most crops. In good seasons the crops of cereals have been enormous, but unfortunately the seasons, so far as rains are concerned, are very variable and utterly unreliable. Stories are told of the speculative sowing of hundreds of bags of seed on dry lands, and the reaping of enormous harvests of oathay and grain; and again the same farmers, encouraged by success to still further speculative efforts in the same direction, being left with very little to show for the outlay in time, labour and seed. It will thus be seen that arable farming in these parts, except on irrigable lands, is largely a gamble, and as such was bound to fall into disrepute. There have been times when the markets were so tempting that even the most conservative and careful of men have been caught in the maelstrom of speculation, but those days seem to have passed, and very little beyond the soundest of sound farming is now followed. Even the livestock markets do not offer the same chances to the speculatively inclined that they used to before the advent of the frozen imports, for though prices may be comparatively high, the demand is strictly limited, and where a far-sighted dealer could place his thousands of small stock and hundreds of cattle for slaughter purposes in the old days, he is now reduced to catering for tens and hundreds. All these influences have reacted on the farming of this district, and where such a thing as dairying would have been considered a little below the dignity of some of the farmers a few years ago, many of them are now making it one of the principal features of their industrial activities.

DAIRYING ALONG THE ZWART KEI.

The introduction of dairying dates back to the establishment of the Bowker's Park Creamery, within a few miles of Queenstown, but it did not

extend to the Upper Zwart Kei until the railway from Queenstown to Tarkastad was constructed. This enabled all the farmers along the river to arrange a system of collection and delivery of the cream at Waverley Station, which goes a good way towards keeping the Creamery going. But when one has travelled along this stream and noted how comparatively small is the output to what it might be, it does not seem to call for prophetic powers to be fairly certain that dairying is only in its infancy here. A great deal is being done to forward this particular aspecting of agriculture, but very much more has yet to be done. The work so far accomplished seems to lie in the direction of development works with the object of providing more pasturage and store fodder for the animals. So far this has largely taken the form of irrigation works and lucerne cultivation. Now valuable as lucerne undoubtedly is, it will never, by itself, build up a sound dairy industry. And necessary though irrigation works undoubtedly are, something more will be needed than these two to make this grass country yield up its full possibilities in the shape of profits to the farmer. For milk something more is wanted, and included in this something more is, firstly a better type of milker than the majority of the cattle I saw in the pastures there. The next thing which will be found necessary will be more and better grass. In good seasons the veld is excellent. Even in the winter it is good in many parts, as is shown by the numerous thorns dotted over the greater part of this valley. But where irrigation waters are available it should pay those who can see a future in dairying to lay down a grass like Paspalum, in the same way as they are now laying out their lucerne lands, for they could then make fairly certain of a good supply of luscious milk-producing fodder, which would, provided they had the right class of stock, make this one of the richest sections in the Colony. As I have remarked before, lucerne is a very valuable crop, but like everything else it has its limitations. The farmer who wants to lay himself out for large and regular supplies of cream must be prepared to provide his cattle with plenty of rich pasturage, and, if possible, so work it by means of irrigation as to have the supply when others are short. It is the man who can enter the markets when supplies are scarce who commands the high prices. In a country such as this, one can always depend on seasons when the irregularity of the rainfall will force a scarcity of supplies somewhere or another. Paspalum is a little troublesome to establish as compared with lucerne, and it has not, as yet, much of a market value as hay, so has to be consumed on the farm, but the man who can establish it, and has irrigation waters to keep it going, will find, only provided that he also starts in with the right class of stock, that it is unsurpassed for dairying purposes in a country like ours. This has been proved in Australia, where the wonderful prosperity of the dairy industry is largely attributed to the two causes mentioned here. In this part of the Eastern Province the conditions would seem to be exceedingly favourable for the establishment of this crop.

WITH MR. ARTHUR FROST AT "SUNNYSIDE."

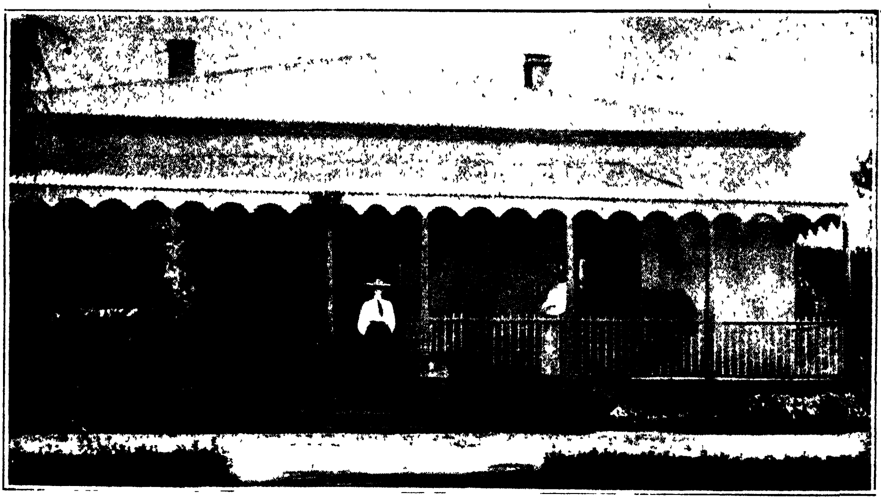
I arrived rather late in the evening at "Sunnyside," the homestead of Mr. Arthur Frost. Like the Kings' on the other side of the mountain, the Frosts are a fairly numerous clan, and they fill a good deal of the local horizon, being all energetic and active farmers. There should be little need to introduce them as the sons of the veteran Sir John, of that ilk, whose name has been before the public of this Colony for the better part of half a century as farmer, soldier and statesman. When Sir John Frost first settled in these parts, away back in the early days of the Frontier, as it was then, this country was held on military tenure, and the farmers were neither more nor less than a garrison, pioneering the way for civilisation, which has

followed more rapidly on their heels than they anticipated. In fact, it is an open secret that when Sir John found himself allotted to this somewhat out-of-the-way spot he was not at first over pleased. But like the sturdy yeoman and pioneer that he was he faced his difficulties manfully, and after struggling with his isolation and the initial difficulties which always stand in the way of the advanced guard of civilisation, managed to secure success where at first it seemed doubtful. These were the days before railways were considered to be within the range of practical politics, at least for such places as these, and whatever was produced had to be transported many miles by ox wagon before even the limited markets of those days could be reached. Sir John's farm was further on in the valley, and is known as "Thibet Park," and is now in the occupation of Mr. W. Frost. It can only be presumed that the name given to it was a gentle reminder of its inaccessibility, for in those days Thibet was probably the most inaccessible spot on the globe.

After a night's rest I had a good look round "Sunnyside," and was soon deeply interested in the productive possibilities of this large and capacious property. It is pleasantly situated on the banks of the Zwart Kei River, which here forms the boundaries of the two districts. In addition to "Sunnyside," Mr. Arthur Frost has also a large farm on the other side of the river, known as "Lilyvlei," so he has plenty of veld and to spare. "Sunnyside" itself lies on a gently undulating flat, sloping towards the centre into a slight depression, and here the soil is fairly deep, if one may judge by a big sluit which has cut its way through the alluvial to a depth of some twenty to thirty feet. Near the homestead the irrigable lands are laid out in wide and pleasing expanses of lucerne, all watered from the river, and in these beautiful paddocks surrounded by belts of gums and other protective vegetation, the stud rams of the farm are kept in veritable clover. The farm is mainly carried on for cattle and woolled sheep, and as such seems to be admirably suited. Large flocks of Merinoes are kept, the wool output being something considerable. The type of sheep selected are mostly of the Tasmanian class, and these seem to thrive splendidly. The flock was founded from the stock originally introduced by Sir John Frost to "Thibet Park," which was all Tasmanian, and this has been built upon until they are able to turn out rams on the farm almost equal to those they can import. There have been infusions of Vermont blood from time to time, but only of the best types, and it is not a very prominent feature of the bulk of the flocks I saw. The new blood includes some of the Gorham strain and other well-known flocks, including Williamson and Davis Corsitt. But all through the flocks the strong strain of Tasmanian is largely traceable, and as the tendency seems to be to fall back again on that type, this marked tendency is bound to bear upon the future. The originals of the flock were bred by Mr. Gibson, of Scone, Tasmania, and well they have maintained their characteristics in this country. Some of the ewes Mr. Frost has are still quite typical of the best of the Tasmanian type, and, though perhaps losing slightly in density, and without the carcase of the larger bodied sheep of the Rambouillet type, which have formed the foundation of most of the flocks about here, they are yet sufficiently striking to support the hope that with the introduction of fresh blood and judicious handling there is some very valuable material among them. Sheep are going to be a strong feature of the farming of these sections, and the best will be none too good in the future.

Mr. Arthur Frost's Angus Cattle.

The sheep I could see in the paddocks and kraals near the homestead, but for the cattle I had to move far afield. Starting out in a cart and pair, we crossed to the other side of the farm, and after driving for the



Front of Homestead "Sunnyside."

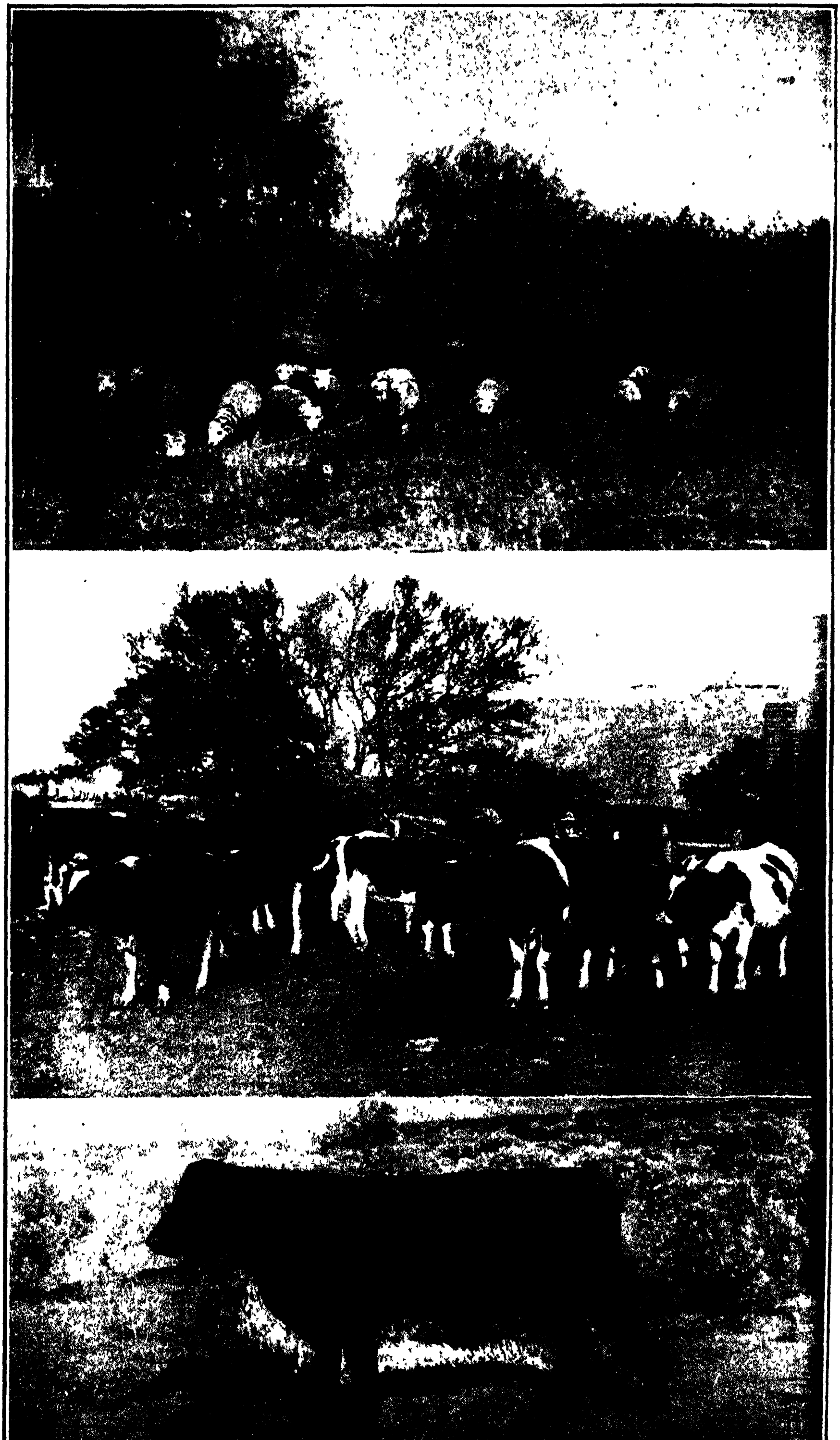
The Stoep at "Thibet Park."

The Homestead and Garden at "Thibet Park."

The Homestead at "Sunnyside."

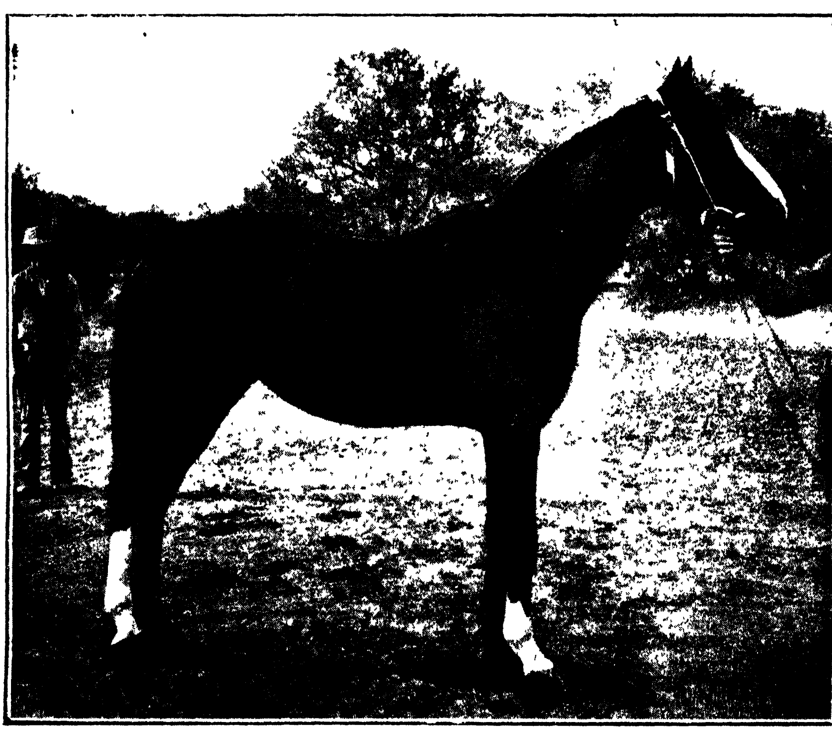
The Zwartkei at "Thibet Park."

THE ZWARTKEI AT "ROCKLANDS," Mr. George Frost's Homestead, showing the River and Drift in the Foreground.



1. Tasmanian Rams in Lucerne Paddock at "Sunnyside.' 2. Friesland Milkers at "Thibet Park." 3. Polled Angus Bull at "Sunnyside."

TASMANIAN RAM, the Property of Mr. Arthur Frost, "Sunnyside."



Imported Thoroughbred **PEARL D'OR** at "Thibet Park."

better part of an hour through excellent thorn veld, came up with the herds contentedly grazing in the bright sunshine towards the mountains which tower above Groen Nek. Mr. Arthur Frost's herds of Black Angus cattle are well known in these parts, and though, as a breed, they are scarcely ideal for dairying purposes, the output of cream is considerable and quite sufficient to justify an extension of the farming operations on this side. In conversation with Mr. Frost I learned that he does not propose continuing with his Angus stock much longer, but intends to gradually replace them with a better milking strain. With such advantages as he has here, it would seem that there is a great future for dairying, but like so many more energetic men who have these very large properties to handle, Mr. Frost is beginning to realise that an extension of such activities means an enormous demand on the time and energies of one man. It is not an easy or satisfactory task to chase cattle in the open veld with a camera in a vain endeavour to induce them to stand for their photographs, as I found after much toil and labour, and I fear that the snapshots I obtained scarcely do justice to the subjects. The bull was particularly shy, but after dodging him around the bushes, I caught him in a poor light for a few seconds and reproduce him herewith. I was not so fortunate with the others I essayed, so he must stand as typical of the rest. This herd has been established here for some years, and has quite a reputation in the district. They have crossed satisfactorily with the Friesland, and produced good beef and transport animals, while their milking properties, though not by any means of the first, have always proved fairly satisfactory Of

The Homestead and the General Farming

carried on here one can have nothing put praise. The buildings are all of a most substantial character, the dwelling house, though unpretentious from the outside, is comfort itself when once within its hospitable walls. It belongs to the types that went with the earlier days, and has suffered from being added to by degrees as the necessities arose, but even the irregularities of such a place have quite a quaint charm of their own. In front of the homestead is a nicely laid out garden, and in a position of some difficulty a goodly number of trees of various kinds have been induced to grow. The position of the house is such that the soil around it is rather thin, it being on the top of a rise, but what there is has been made the most of. The outbuildings are also very substantial and roomy, with byres and kraals for both cattle and sheep, while the whole of the farm is well fenced and camped off into large paddocks for stock. This gives the advantage of free grazing night and day, for the cattle particularly, at very little cost for herding. The water supply is copious in good seasons, such as that which was closing when I was on the farm, but there have been periods when the river was far from satisfactory. One can only presume that this is one of the reasons why lucerne is so popular among the farmers in this section; it is an excellent drought resister. And it does not as yet seem to be generally realised that this is also one of the strong features of paspalum grass. Once it is established it resists drought very well indeed—but it is not nearly so easy to establish as lucerne.

With Mr. W. Frost at "Thibet Park."

Pushing further along towards the mountains I arrived at "Thibet Park," where I found Mr. W. Frost and his family. At this point I crossed the Zwart Kei River, and was then actually in the district of Queenstown, as this farm, at least the homestead and a great part of the farm, are in that district. The farming conditions here are very similar to those at "Sunnyside." Cattle and sheep are the staple lines of production,

the arable farming being subordinated to the needs of the stock. Some may wonder why such farms as these are not greater producers of grain and breadstuffs, but the lessons of experience, as I explained in my preceding notes, have all gone to show that grain farming, or the production of cereals on anything like a large scale, is not what might be fairly described as a payable commercial proposition. And even farming has its business aspects—despite the popular belief that it should be largely a matter of pleasure. At "Thibet Park," ever since the days when Sir John Frost first settled there, stock has been a prominent feature. If there is one branch of farming to which Sir John was more devoted than any other it was the raising of high class Merino sheep, and one has scarcely entered the farm before this is impressed upon even the casual observer. Like "Sunnyside," the main interest is sheep and cattle, the former for wool and incidentally for mutton, and the latter for dairying and incidentally for beef. The sheep come of the same strains as those of Mr. Arthur Frost, the foundations of the flocks having been laid by Sir John Frost, as I have stated previously. In fact the remarks made on the Sunnyside flocks apply with equal force to those of "Thibet Park," with the exception that the Tasmanian strain seems to have been retained with even less infusion of other strains than at "Sunnyside."

The farm itself is beautifully situated on the banks of the Zwart Kei River, which flows through bush-covered banks at this point, and only emerges into the open lower down. "Thibet Park" is higher up the river than "Sunnyside," and consequently this farm has more mountain veld. In fact the valley in which these properties are situated narrows in at this point, and the Little Winterberg mountains are much closer on the one side, but on the other, the side towards Waverley and Queenstown, it spreads out again into a wide undulating stretch, through which the Zwart Kei River winds its way towards the lower levels. The drift on the wagon road passes quite close to the homestead, and this occasions a certain amount of trouble and worry on the farmer, for he is frequently called upon for help when wagons or carts cannot negotiate the drift in times of flood. It is not only that assistance may be needed, but as this is the one way to Tarkastad, the owner of "Thibet Park" is constituted general janitor of its condition. It is not at all an uncommon thing for native wagon-drivers to leave large stones in the drift after having experienced some trouble in getting through, and then those who come after them run the risk of capsizing their carts. It is these little matters which prevent the farmer's life from becoming too monotonous. For when a case of this description has to be followed up it means a day's journey into Tarkastad to attend the Court and prosecute.

Below the drift, as I have stated before, the banks of the river widen out and there are some good stretches of deep alluvial soil upon which the waters taken out higher up can be led with ease. These are all devoted to lucerne, and though the paddocks were bare when I visited the property, it being the depth of winter, one could form a very fair idea of the value and extent of the crops. The grazing here is mostly grass with a little bush, but the thorn veld seems very good indeed. It is not nearly so bleak on this side of the mountain as higher up by Vogelstruis Nek on the other side, and cattle particularly seemed to be more thrifty. It may be that the veld suits them better than that of the higher sections. But as the sheep seem to do just as well here as higher up, there should not be so great a difference in the quality of the grazing.

Of the cattle there was a fine troop near the house when I sallied out in the morning to have a look round. These are mostly of the Friesland type, and have been bred up from stud stock obtained of Mr. Cross, of Queenstown, and Mr. Vermaak, of Steynsburg, both being good herds of well-known character. These again have been crossed with the Angus type,

from "Sunnyside," and though the results are fairly good, they are nothing like the type of animal which should be produced in such favourable conditions, especially if dairying is to be taken up seriously as an industry Already large quantities of cream are being sent down weekly to the Bowker's Park Creamery, but from such a country as this, the supply should be quadrupled with very little effort. Again, one is compelled to draw attention to the advantages of planting paspalum grass even though it might take the place of lucerne in some camps. All the conditions exist about here for a huge dairying industry if the farmers could only realise the splendid opportunities which lie before them. All they need look to now is the provision of a better class of milk stock and more suitable permanent pastures. There is no need to suppose that the lucerne cannot be made of great use and benefit for dairying purposes, all I wish to impress upon farmers working in a natural grass region is that if they wish to secure and maintain a good flow of rich milk they must provide lush pastures, and they all know the danger of feeding green lucerne to cattle. The hay is very nutritious, but is by no means an ideal milk producer. It needs to be supplemented with green pasturage or ensilage, or some other soft foods if the flow of milk is to be maintained at its highest and best. These are the little details which go to the making or marring of dairying as an industry whether in supporting a Co-operative Dairy like Bowker's Park or in the course of private business.

The homestead at "Thibet Park" is quite an unpretentious building, being one of the oldest in the district. It is, however, beautifully situated in a veritable bower of a garden, and kept in excellent condition. The irrigation waters from the river are brought on to the ground in furrows, and as the soil is all deep alluvial silt, it is very rich, and the vegetation, both ornamental and useful, is exceedingly abundant. Unfortunately when I was there it was practically the depth of winter, and nothing was showing up very satisfactorily, but one can imagine the springtime here as being simply exquisite.

Among the stock on the farm I had the pleasure of seeing the imported thoroughbred horse Pearl D'Or, out of Mother of Pearl, by Golden Crown. He is a fine upstanding animal of a very useful type for the district, not too fine, yet with sufficient quality to give encouragement to the hope that, properly mated, he might produce something that would make a stir in the district. In any case he should throw some very useful stock. Mr. Frost is to be congratulated on his possession.

Leaving "Thibet Park," I had to make my way back along the Zwart Kei River to Waverley, in order to pick up the train there that afternoon, otherwise I could not have caught another train for three days. For this reason I was compelled to hurry along and content myself with a bird's-eye view of the rest of the country. At "Rocklands," the homestead of Mr. George Frost, where the road re-crosses the river in order to reach Waverley, I made a slight halt and secured a snapshot of the homestead with the river flowing in front, but for the rest I had very little time to do more than make a few passing notes. Cattle and sheep are the staple products all through this valley, and with the further extension of irrigation activities there seems every probability that these twin industries will develop on a very much larger scale later on. At present there is a good deal of the experimental about both of them, although they have been established a good many years. This particularly applies to the dairying cattle. As we moved lower down the valley the types of cattle changed, and by the time we had reached "Rocklands," I found myself among some very good Shorthorns. Mr. George Frost has a large herd of this type of cattle, and they are doing very well with him, especially the selected milkers. Down towards Queenstown, too, the Shorthorn, of the red Lincoln type, it catch-

ing on as a good milking strain as well as being hardy and fairly prolific. But the best type of cattle that I have seen in these parts is the small compact Friesland, like those which used to run at Bowker's Park when Mr. Hodges had it. If this class of stock could be more generally raised in the district, or an infusion of the Ayrshire type tried, the dairying question should soon be solved. Still keeping along by the river, on the banks of which the cultivation increases very perceptibly the lower one gets, I reached Kleinhaasfontein, or Waverley, as it is now called, and caught the train for Queenstown and headquarters once more, being particularly well pleased with the results of my rather hurried trip. The rich alluvial along the Zwart Kei, which is more particularly noticeable after leaving "Rocklands," is being rapidly developed, and wherever water can be led out, irrigable lands are being levelled and prepared for lucerne. This crop should soon, therefore, begin to loom very big in the local horizon. It is to be hoped that the increase of stock will keep pace with the increase of fodder. If this occurs then all will be well. If not, the energy now being expended may be found to be less valuable than is now anticipated. Still, it cannot be all thrown away, so one cannot but wish it every success.

INTER-COLONIAL AGRICULTURAL UNION CONGRESS.

PRESIDENT'S ADDRESS.

The President (Mr. C. G. Lee) delivered the following inaugural address at the Third Inter-Colonial Agricultural Union Congress opened in Pretoria on the 30th ult :—

Gentlemen,—In welcoming you to the Third Annual Congress of the Inter-Colonial Agricultural Union of South Africa, I feel that I must first congratulate you upon the apparent fact that our Union is growing both in strength and importance. In the face of the representation here, it would be positively ungracious not to express the full belief which I hold that this Union is bound to become a power for good, not only to the pastoral community of this country, but to the general community as well. Any country that has farmer citizens willing to give time and thought to building up associations and societies of the kind represented here, has solid reasons for great hope for its future. It must ever be encouraging to know that this country has farmers and others interested in the land possessed of such patriotism as causes them to lay aside their more direct private affairs and to gather here, and practically at their own cost, for the general welfare. Our future possibilities are further rendered almost immeasurably great when such keen interest is shown in the land by the various Governments represented here to-day through their scientific experts and officials. Last year, when we met at Cape Town, the number of States represented was but three, namely, the Transvaal, Natal, and the Cape Colony. To-day we assemble as representing practically every State within the sphere of British rule south of the Zambesi, and if we can but progress along the lines hitherto laid down, there is no reason to doubt but that we shall ultimately hold our annual congresses as representing the whole of the sub-continent, with delegates from the other States within those boundaries which owe their allegiance to other Governments.

The Necessity for Organisation.

Without wishing to appear to be anxious to apologise for the existence of this Union, I trust I may be pardoned if I devote a few words to showing how imperatively necessary an organisation of this description has become in the peculiar conditions of this country. We have a large extent of land, for the most part very sparsely populated. We have political boundaries and divisions which we all trust may some day disappear; but meanwhile we have to recognise the facts as they are. We have a large native population scattered in groups all over these territories, a population which should yet prove a source of great wealth and assist in forwarding the well-being of the States, if it can only be properly handled. We have

a country which is naturally rich in many respects, but it seems the fate of every effort to wring prosperity from its soil—whether in the form of mineral, pastoral, or agricultural products—to be faced with more than the usual share of difficulties. In other words, it is, as your President last year stated in his opening address, "a hard country." It is not for me to dilate upon the obstacles and difficulties which have been met with in the course of the development of the great mineral industries; it should be sufficient for me to touch upon some of the troubles and difficulties which the farmers have had to face in order to convince all who will take the trouble to look dispassionately into these questions for themselves how necessary it is for us to combine and work together, district with district, and State with State, in order to reach the goal we are all, I trust, aiming for. This goal, so far as the farming community is concerned, is, I take it, increased production and a natural enhancement of the permanent wealth of the State. The questions which affect the farmer in any country affect, both directly and indirectly, every section of the population in which he lives. The exploitation of very rich mineral deposits may be taken as an exception to this rule, for in that case, for the time being at least, the miner may be, to a large extent, independent of the local producer. But in the end, even the richest mineral deposits become exhausted, and when that time comes, it is a poor look-out for the State if permanent industries have not been firmly established to take their place. So no matter how one looks at this question, the only really permanent wealth of the country is its soil and the people upon it. It is therefore certain that if we in South Africa are to build up, as we hope, a powerful and united people, it is our duty now to do all we can to lay the foundations of permanent prosperity by encouraging and forwarding in every possible way our natural industries—in other words, farming in all its various forms, and the production of foodstuffs, animal products, and, as far as possible, every kind of raw material for the manufacture of textile fabrics. The only reason why we should do this is because by no other way can our permanent prosperity be secured. We stand in the simple position of the man who intervened in an argument as to why the ladies made such a fuss about food. His unanswerable solution of the question was that he supposed it was because we lived by it. Our position is that not only do

We Live by Agriculture,

but the whole world is in the same dire straits; and so long as human nature is as it is we shall have to depend on agriculture for the bread and meat we need for our support, as well as for the clothing we wear and everything else we use, whether necessities or luxuries. For even luxuries are the product of human skill, and those valuable gifts would be of little account were there no foodstuffs to maintain the bodies of those who wield them. So that, look where we may, everything in this world comes back to the soil ultimately. Now, gentlemen, when we start with these admitted facts and try to think out the future of a country like South Africa, there seems, at first sight, very little prospect beyond the mineral resources, for our pastoral and agricultural pursuits so far have been carried on in such difficult conditions that, judging by the import returns, we have never yet succeeded in feeding ourselves, let alone growing sufficient in the shape of agricultural produce to exchange for the imported articles we consume. This is a lamentable admission to be compelled to make, but instead of being a cause of discouragement it should, in my opinion, act as a spur to us all to so organise our work that this state of things should be changed. It has always to be remembered that we are following in the footsteps of some of the greatest pioneers the world has known. To those who went

before us and carved out homes for themselves in the wilderness of Africa, as it was then, our position to-day is that of affluence and luxury. If we could conceive the return of the Voortrekkers to life as young men, and their being placed in the conditions which surround the average South African farmer to-day, we can imagine them being a little impatient at many things, and sighing perhaps for the freedom and expansiveness of the old life, but we cannot imagine them finding fault with the facilities provided for getting their crops and stock to market or the help and sympathy which is so rapidly developing all over the country for the farmer and his difficulties. Not that I think we should as a consequence be content because our conditions are better and more favourable than were those of our forefathers, and sit down without making further efforts towards improvement. There are many things which have yet to be done which must have a great effect upon all agricultural activity in this country, and some of these I hope to see forwarded at this Congress. First and most important of all among the many labours which have to be accomplished is

THE ENCOURAGEMENT AND REHABILITATION OF OUR GREAT STOCK INDUSTRY.

In glancing through the agenda I see that this section has not been overlooked. We have only to consider the position of the stock industry of this country as many of us have known it in our own times to realise how much can be done in this direction towards resuscitating the agricultural credit of the country. It does not call for the memory of the oldest inhabitant to tell us of the ravages of stock diseases, many of which but a few years back were a complete mystery in their occurrence even to the greatest minds in the scientific world. I have but to mention a few of these scourges to impress you with the important part they have played in throwing the whole country back at various periods. When we think of the terrible decimation of our herds by redwater and rinderpest, and later on by an even more virulent pest in the shape of African Coast Fever; of the enormous losses the country still suffers from horse-sickness; and again of the dread disease known as heartwater in sheep and goats which has rendered farming with small stock next to impossible in many parts of the country; one is almost tempted to think that such a thing as the establishment of any form of animal industry on a large scale is utterly impossible. Yet, gentlemen, the longer we live the more it is being forced upon us that not only should it be possible to reinstate our animal industries as they existed before the pests I have mentioned assailed them, but by care and forethought to so establish them that they may yet prove the salvation of South Africa. Other countries have had similar troubles and overcame them without the knowledge which we have now at our disposal, thanks to the great attention which has been attracted to us on the part of the scientists of the world by these very afflictions. It is a scientific age, and if we are wise we shall take every advantage of the knowledge which science is daily putting into our hands. If we do this we are now assured of successful methods of fighting most of the plagues which have hitherto oppressed us. When we come to think of the truly great work done for us by the late Dr. Hutcheon, the pioneer of veterinary science in South Africa, whose memory should be revered for all time by every stock-farmer and owner of animals in this country; when we add to that the further efforts of those who like Mr. Lounsbury in his investigations into the life history of the ticks gave us the clue to many of our troubles; and of Dr. Theiler and his great work —and the many others who like them are still with us giving of their best for the good of the whole community, I maintain that there is great room for hope and the liveliest sense of the future prospects of pastoral farming as the

One Essential Industry of the Country.

If we consider the position impartially to-day we may take comfort. We are in the midst of a great depression; the country seems to be passing through a period of transition. Yet on every side we find that though the farmers are partaking in the general trouble, as a whole they are suffering less than the bulk of the other sections of the people. My firm belief is the reason for that is because agriculture is beginning to regain some of its lost ground; and this is largely owing to the fact that we can now face with a certain amount of equanimity many of the troubles which used to threaten us with complete ruin a few years ago. I am speaking now from the standpoint of the stock-farmer. For all that it will not do for us to sit still and leave the great work of rehabilitating our industries to the hands of others. We must be up and doing, and while the scientist works in his laboratory and continues his elaborate experiments for our ultimate benefit we must give him every encouragement and support. This can be done in two ways. The one is by the prosaic method known as "going to the Government" in order to secure ample funds for the continuation of these labours and bring them to a successful issue. The other and more important is that of intelligently watching the progress of events and adapting ourselves with care and thought to the new methods which are introduced from time to time. It is safe to say that had the pastoralists of South Africa taken full advantage of the opportunities offered by science from time to time for the prevention or eradication of disease South Africa would have been richer by many millions to-day. I have a lively recollection of one particular incident which will remain with me till the end of my days. In the early periods of the Angora Industry of the Cape we managed to import a contagious lungsickness from Asia Minor which is a great scourge in that country. Fortunately for this industry the late Dr. Hutcheon took the matter in hand in its beginning, and by the drastic measure of slaughtering all infected animals and isolating all in contact with them, succeeded in stamping out that disease, and it has never been seen since. Had we, for instance, taken lesson by this and at once tackled lung-sickness in cattle in the same way, how many millions of head of stock should we not have saved during all the years which have intervened. This policy is now being gradually adopted in many parts of South Africa, and if carried out with care and circumspection, should soon show good results. It is for us to support measures of this description, and though it may appear to bring hardship in its train at first it must ultimately re-act to our own good. Take again the practical side of our industries. We are all now, I trust, taking more care of our stock than we used to, and what is of more importance, trying to breed and rear a better class of animal. The day of

The Unprofitable Animal

passes away once the farmers begin to realise how much more advantageous it is to keep and feed the profitable ones. We have plenty of encouragement to do this if we only look at the enormous quantities of foodstuffs imported every year. I am aware, none more keenly, that many of our farmers, particularly in these northern districts, are not enjoying the prosperity that is the lot of the stock-farmer. But their day will come too, if we can only gather together in meetings like this and bring the whole force of the intelligence of the country to bear on the great problems which have to be solved before all our troubles can be conquered. The agriculturist has to contend with locusts and droughts—even the stock-farmer is not entirely immune against these troubles. We may not be able to devise means of preventing the periodic droughts which afflict this country, but we can

by consultation bring our combined influence to bear upon the forwarding of irrigation works, the sinking of artesian wells, the construction of storage dams and the tapping of rivers with which to provide against the worst. We may not be able to banish all the locusts from the land, any more than we shall ever succeed in entirely doing away with trouble in the world—but we can, by our combined efforts, insist upon some plan which should commend itself to the various Governments by which these periodic visitations might be considerably minimised. We have it on excellent authority that God helps those who help themselves. Many believe that the locusts are sent by a wise Providence to chasten us. That may be so, but we may as fairly suppose that the particular sins which they are meant to correct are sloth and indifference. In that case the best thing we can all do is to be up and doing and drive the pest from the land. For even though we may not succeed we shall have the satisfaction of knowing that we have laboured, attempted, and done, something, and that in itself is invigorating and strengthening. It is the same with the other questions which will come before you. We are here to discuss them impartially and fully, and though we may not all agree in every detail I trust that our deliberations will be conducted with due consideration for each other's views, and that their results will be sound conclusions which, when presented to those whose opinions we wish to influence, will carry the weight of thought, moderation and sound sense with a due appreciation of the best interests of the country in which we live, and hope to set the example we wish our children's children to follow. In all that I have said regarding the comparative satisfactory outlook for the stock-farmer, I have at the same time much sympathy for those at present suffering from that terrible disease, African Coast Fever, and I believe every one here also sympathises with them, and trusts that this Conference's deliberations will tend to help the sufferers. I cannot conclude without

A Word of Thanks

for the help and encouragement I have received from the many co-workers. There is one name I must mention, that of your Secretary, Mr. MacDermott, to whom I am indebted for a great deal of help cheerfully given, and which will assist this Union. I take it the Colonies and States have not assembled with the set purpose to drive hard bargains or to seize one from the other the maximum obtainable and to give in return the minimum that can be spared. I believe this Conference has met prepared to view South Africa (at least as far as farmers are concerned) as one great farm, jointly occupied by those you represent, the aim being to pool for mutual benefit all your experiences and labours. And, gentlemen, if we approach and discuss all the subjects before us in this spirit—then, and only then, will the amicable settlement and solution of many of our most difficult problems be found. And as the settlement of these questions should develop a still greater amount of that courage and steadfast endurance necessary to stimulate the wise persistence and patient perseverance which is the key to unlock the door to far greater success, I sincerely trust that it is in this spirit we enter upon the great and responsible work of this Conference, which work, I believe, will result in good for yourselves, for those you represent, and for the whole of our dear country.

MILK RECORD.

[ELSENBURG COLLEGE HERD.]

Subjoined is the Milk Record to 30th September :—

Breed and Cow.	Days in Milk.	Yield in Lbs.		
		During September.	Total to date.	Daily Average.
FRIESLANDS.				
Romula	231	872·5	7394·5	32
Victoria	220	747	5971·5	27·1
Violet	103	882·5	3387·5	32·8
Bell	61	921·5	1902	31·1
Rose	35	1314·5	1509	43·1
JERSEYS.				
Gladys	116	921	4001	34·5
Gertie	106	866·5	3446	32·5
Fuschia...	42	778·5	1047·5	24·9
Grace	42	666	880	21
Gwendolen	26	726·5	726·5	27·9
Gilliflower	30	1079·5	1079·5	35·9
AYRSHIRES.				
Cherry	162	330	3266·5	20·3
Queen Dot	111	639	3014	27·1
Lobelia	59	779·5	1800	30·5
CROSS.				
Disa (14 days)... ...	180	252	3892	21·6

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during August, 1907.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	German South West Africa.	9	Bananas ...	7,700	9 8 0
" ...	"	81	Apples ...	12,150	38 13 0
" ...	"	70	Oranges ...	11,210	27 0 0
" ...	"	8	Lemons ...	1,550	3 12 0
" ...	"	9	Pineapples ...	886	8 14 0
" ...	"	8	Naartjes ...	1,900	4 3 0
" ...	England	13	Oranges ...	325	4 0 0
" ...	"	77	Naartjes ..	1,335	6 15 0
" ...	Portuguese West Africa.	23	Pears ..	3,000	20 0 0
" ...	"	50	Apples ..	3,600	40 0 0
" ...	Portuguese East Africa.	70	" ..	3,000	21 0 0
" ...	"	40	Pears .	1,600	9 0 0
" ...	"	10	Oranges .	500	3 0 0
Port Elizabeth	England	15	Pineapples ...	450	2 12 6
"	"	87	Oranges ..	7,830	25 0 0

CO-OPERATIVE BACON CURING.

By LOUDON M. DOUGLAS,

Author of "Manual of the Pork Trade," "Douglas' Receipt Book for Bacon Curers, etc."; Joint Editor of "Douglas' Encyclopædia of Bacon Curing, Meat, Food and Provision Trades"; Editor of "Douglas' Encyclopædia of Dairying"; Author of "Refrigeration in the Dairy," etc., etc.; Joint Editor of Dr. Swartz's "Abattoirs and Cattle Markets," etc.

The principle of co-operation in agricultural pursuits lends itself to the art of bacon curing in a very special degree. This fact has been realised in Europe to such an extent that the majority of the factories in Denmark are now on the co-operative principle. In the United Kingdom bacon curing in a co-operative way amongst farmers is only now beginning, there being in course of erection, at the present moment, one factory with this end in view, at Roscrea, in Co. Tipperary. Whether it will follow on the success which has attended the Danish system or not remains to be seen.

It was in 1898 that the first co-operative bacon factory was inaugurated at Horsens, in Denmark, and since then it has been followed by 32 other ventures of a similar kind, all run by farmers. There are, to be sure, some 24 other bacon factories in Denmark, so that the country has developed bacon curing to an enormous extent. It will be noticed that Denmark is only a very small country, so small indeed, that it is just about the size of the province of Munster, which is a small part of Ireland. Notwithstanding this fact, and also that the agricultural conditions to begin with, were of the most adverse character, nothing but success has been met with in dairying and bacon curing since it was recognised that these two industries hung together. The Danish farmers started out with the intention of butter-making, mostly for export to England, but they very soon found that they were overloaded with bye-products in the shape of separated milk and other residues, which possess no value, or comparatively little value, in a dairy, but which when fed to pigs become valuable commodities. This fact, therefore, is the one which must be first recognised in the contemplation of any development in dairying in any country, namely, that the production of butter necessitates the growing of pigs for bacon.

It may be as well to recite here what has been done in connection with the thirty-three co-operative bacon factories in Denmark up to date. In 1906, it appears, that the membership was 91,000, and during the same year the factories handled amongst them an aggregate of 1,051,358 pigs, or an increase of 18,000 as against the previous year. The revenue derived

amounted to nearly £3,500,000 sterling, which was a record in the way of revenue, and clearly demonstrates that co-operation in bacon curing under proper guidance is likely to be a huge success.

It may be well to consider under what conditions a co-operative bacon factory may be started. In Cape Colony the conditions are not altogether similar to those in existence in a small place like Denmark. As a matter of fact that country could be placed conveniently in a small corner of Cape Colony, and its presence would hardly be known. The distance between farms is, of course, very great, and the difficulty of transporting the products of dairying as well as pigs is very apparent. With resolute determination, however, to overcome these difficulties there is no doubt that a certain measure of success is capable of being attained in bacon curing in Cape Colony at once. This is bound to be so if the bye-products, which are likely to become free in consequence of the recent development of dairying, are properly utilised. This is the crux of the whole matter, and it should be clearly understood that wherever a creamery or a dairy factory is established there should also be an immediate development in the breeding of pigs.

The essential features of the co-operative system are, the joint guarantee which is given by the farmers who compose the societies, and in the case of Denmark, the absence of capital paid down. In place of the latter the banks accept the guarantees of the farmers, who in turn guarantee to deliver their total supply of pigs to the factory belonging to the society of which they are members. The farmers agree to supply all their pigs under a penalty, which has been fixed in Denmark at about 11s. and in the United Kingdom at 10s. for non-compliance. This salutary rule, however, is hardly likely to be put into operation, but it is quite feasible that some members may treat the factory dishonestly, and in that case the rule should be put into force with the utmost possible rigour. The form of guarantee such as is used in Danish factories is as follows:—

"We the undersigned hereby declare that we are willing to deliver to the co-operative factory which it is proposed to establish at ———, all the pigs, of weights from 150 to 200 lbs., which we may produce for sale. Such pigs are delivered on conditions which will be more definitely decided in due course by the shareholders of the society, that we shall receive such amount in payment of such delivered pigs as may be realised for them by the factory less preliminary expenses incurred in the organisation of the society and the annual instalment on loan for building and plant payable during a period of about twenty-five years together with the current working expenses."

There are, of course, subsidiary rules in addition to the foregoing, but this rule comprises the principal obligation entered into by the members.

In the United Kingdom, co-operative societies are registered under the Industrial and Provident Societies Act, 1893, and they, therefore, do not come under the same category as joint stock companies. To all intents and purposes, however, they are really joint-stock concerns, inasmuch as the share capital is subscribed by the members, and they are jointly responsible to the extent of their shares for the conduct of the society. Thus the rules which govern the Roscrea bacon factory are simply an adaptation of the rules which apply to all societies registered under the Friendly Societies' Acts. At Roscrea the number of members is about 3,600, and the share capital at present subscribed is about £11,000. The cost of the factory when finished will be about £7,000, including machinery, and the buildings; about £4,000 of this sum is necessary for machinery. The total capacity is, to begin with, 500 pigs per week, but with comparatively little ex-

pense an extension to 750 pigs per week can be made, and the output could be doubled with an expense of about £1,500.

An important rule is that which defines who are the members, and which reads as follows:—

"The society shall consist of the special members who sign the application for the registration of the society, and of all such other persons as the rules direct or the committee may admit subject to the provisions of the Act. Each individual member shall hold at least one transferable share, and each society or company one for such number of members as the general meeting shall fix. Special members shall be admitted without any special application to hold such number of shares as an individual member is required to hold. Every member and other person applying for admission shall receive a copy of the rules on application on payment of sixpence."

Another rule governs the applications for admission and which reads thus:—

"Every application for admission shall be considered by the committee or by the special members previous to the formation of the committee. At its first meeting after it is made or so soon thereafter as is practicable and after it is proved, the name of the applicant shall be entered on the list of members and register of shares hereinafter mentioned with the number and description of shares required to be held by the rules or any larger number applied for and allowed to be held thereby upon such approval and such confirmation thereto, if any, as the rules may require."

When once the rules have been got together it will be the first duty of the committee to consider a site for the construction of a factory. There are certain conditions which must be present. In deciding these, two points should be borne in mind; the site should, as far as possible, be in a central district which can be easily approached by the majority of the members, and there should be a large supply of water which is used for condensing and washing purposes. The means of transport both for live-stock and for the manufactured products should be close at hand so that any delays will be avoided. The presence of a town is, of course, a considerable advantage, inasmuch as it means that there will be a ready sale for the offal belonging to the factory. The offal consists of a quantity of very easily perishable material which it is always best to get rid of at once.

Given these conditions, then it is next necessary to arrange about the building itself. During recent years it has been shown in Europe that very costly buildings such as used to obtain in connection with bacon curing, are wholly unnecessary, and in Cape Colony it would only be necessary to provide a building partially constructed of either timbers or corrugated iron, the engine room, chill room and cellars only, being constructed of solid building material such as concrete or stone. Factories can be constructed of many different sizes capable of handling from 50 pigs per week up to any number. The most convenient size, however, is a factory in which can be accommodated about 500 pigs per week, although it might be wise in starting a new industry in a comparatively new country to begin with factories handling, say, 100 pigs per week and placing them at convenient distances apart; a greater number can then be worked up to as the business develops.

The departments in a modern factory consist of pig sties, abattoir, hanging house, chill room, cellar, packing house, sausage room, lard department, smoke houses, drying room, engine room and boiler house, offices and farmers' room. These various departments can be elaborated in great detail, and each has its own particular equipment designed to suit the manufacturing of various goods. The technical details and mechanical

equipment of such a factory would involve a considerable description, which would not be of very much service in the absence of any place already built, which could be seen. Suffice it to say that the machinery is of a most ingenious kind, and is the product of much skill in engineering specially applied to this particular business. The principal machine in the factory is the refrigerator which is used to cool the cellar and chill room. The chill room is usually kept at a temperature of 38 degrees Fahr. and the cellar at 42 degrees Fahr. The chill room has an atmosphere of cold dry air, whereas the cellar is humid.

It will perhaps best serve the purpose if we recite the operations which take place in a modern factory as they occur. The pigs, which have usually been rested, are driven into pig-sties and from there into a sticking pen, where they are shackled one by one by means of a chain being passed over one of the hind hoofs. The animal is hoisted in this way quickly by means of a winch to an overhead track bar, and when in that position is despatched, the blood being let out by means of an incision through the neck in the direction of the heart which severs the main arteries. In a few seconds the carcase is free from blood and is pushed along the bleeding passage, where it is allowed to hang for a short time. It is then pushed on to the dumping table and from there rolled into a scalding tank, which is kept at a temperature of from 150 to 160 degrees Fahr. The scalding tank usually has a capacity for three or four pigs at one time, and these are turned round by means of long poles until the hair comes away freely in the hand. The carcases are then tilted from the scalding tank on to the scuttling table one by one, and are scraped comparatively free from hair, this article being saved and, after cleansing, used for various purposes, such as the stuffing of furniture. The carcases are then swung by means of a hook being inserted into the apex of the lower jaw, and the hook, which has two lugs, is swung from a bar which passes under a vertical singeing stack. This singeing stack has a fire which is circular, and the carcases are passed over this fire and kept for a quarter of a minute in the heat. They are thus shrivelled up somewhat and become quite black, the remainder of the hair being thus disposed of. The carcases are then lowered on to the bar again, and are pushed along the bar on to the dumping-table attached to a cold water bath sunk in the floor. This cold water bath is kept supplied with a continuous flow of fresh water, and the carcases are rolled into it so as to cool them. The sinews of the hind legs are then exposed, and gambrels or spreaders are placed in them. A hook is placed in the middle of the gambrels, and the carcases are then raised to the track bar one by one. In this position they are cleansed, and the offal removed, each separate portion being allocated to its specific use. The carcases are then passed along into the hanging house, where the excess of animal heat is allowed to liberate itself. The carcase at this point consists of the body, head and feet and flake lard. This is what is described as the "dead weight" of the animal, and it is upon this weight that a great many factories pay, the other offal being disregarded. As soon as the dead weight has been determined, the flake lard is taken out, and the sides are separated the one from the other by taking out the back bone. The head and feet are removed and the four legs are cramped back so as to give a more shapely side. It may be noted that, in giving the dead weight, if the carcases are weighed warm, an allowance of 3 per cent. is deducted for the warm weight. This is a universal practice which obtains in a good many countries.

As soon as the sides are free they are taken off the gambrels and laid on a table, the inside being upwards. They are then scraped and trimmed, the steaks are cut out and the four feet sawn off; the neck bones and aitch bones are cut loose as close as possible, and the spare rib and breast bone go along with the neck bones. The tops of the ribs are also sawn off, the

large vein in the neck is extracted, and the blade bone in the shoulder is drawn out. In this shape the side is ready to be cured as "Wiltshire" bacon. The Wiltshire cut is universal all through bacon curing countries, and the term originated in the county of Wiltshire, in England, where this particular form was originally cut.

There are, of course, many other sections of bacon such as hams, middles, shoulders, rolls, etc., the preparation of which is carried on in modern bacon factories. In the main, however, the curing processes are practically the same with a little variation.

The disposal of the offal, such as head, feet, hocks, etc., must be regulated by the local conditions, and if it be necessary to send these away any distance, they must be well salted and cured so as to prevent loss.

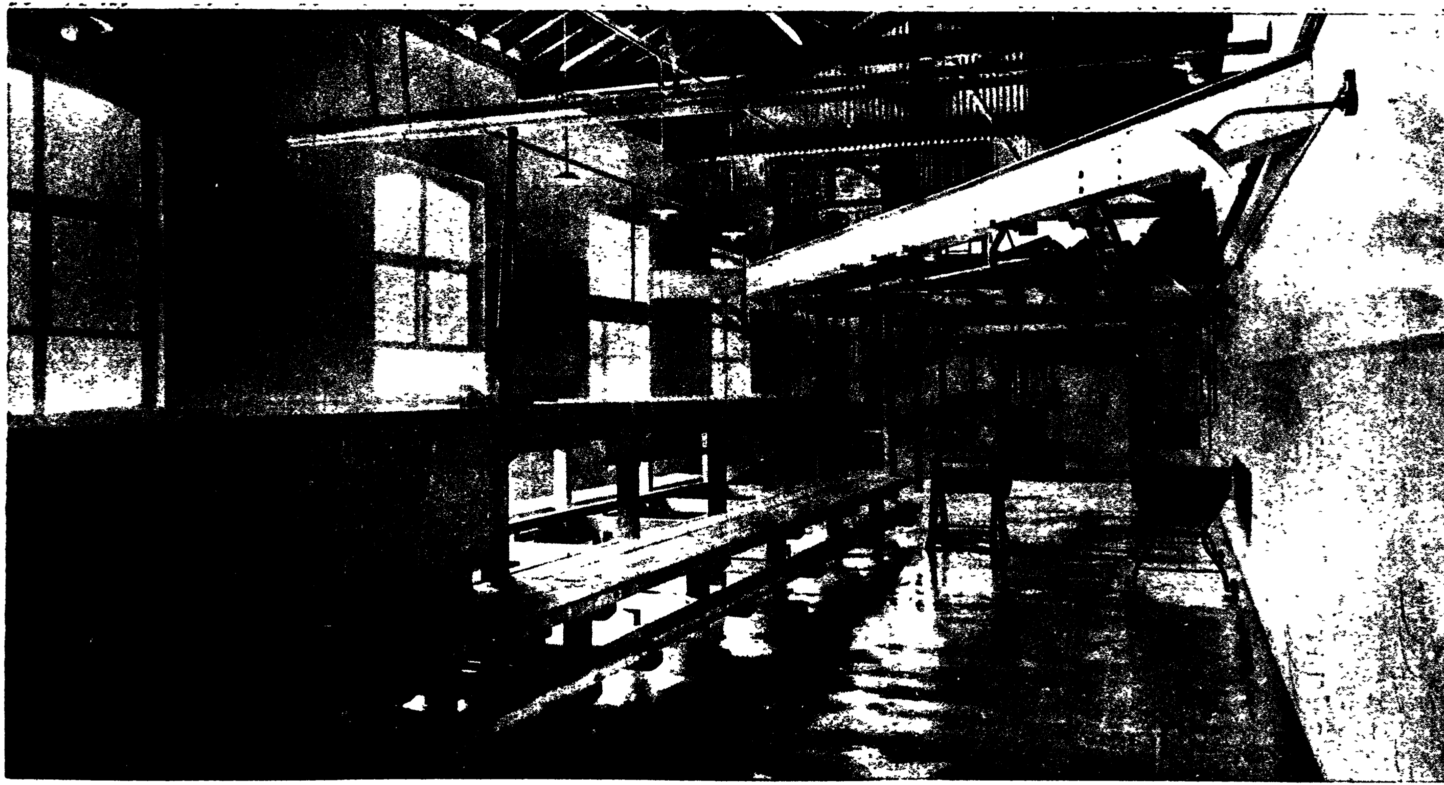
The chilling of the sides is a very important matter. They are hung in the chill room, which we previously mentioned, at a temperature of 38 degrees in cold air, which has been produced by the action of the refrigerating machine. The sides remain in this temperature until they are chilled quite through, and should be at least about 40 degrees Fahr. They are then taken into the cellars, and one by one are pumped with a pickle consisting of 100 lbs. salt, 10 lbs. saltpetre, 10 lbs. cane sugar, 10 lbs. dry antiseptic. This quantity is made up to 40 gallons with water and boiled and skimmed until clear. It should be allowed to cool, and should always be stored in a tank or vat in the cellar itself, so that it will be at the same temperature as the cellar. This pickle is injected by means of a pickle pump into all the fleshy parts of the sides, and they are then laid on the cellar floor. The pocket holes which have been made owing to the withdrawal of the blade bones, are then filled with salt and a little saltpetre and antiseptic, and the remainder of the sides are then sprinkled over with an equal mixture of saltpetre and dry antiseptic, on the top of which a heavy layer of salt is then laid. The sides are allowed to lie in this position for a period of from 5 to 14 days, according to the mildness of the meat that is required. Fourteen days makes really mild cured bacon, and especially when the weather is warm, it would be unsafe to cure the sides a shorter time. The bacon produced in this way must be consumed at once, as it is not intended to keep. If, however, it is intended that it should be kept for a long time it should be again salted at the end of 14 days, and allowed to lie in the curing bed for at least a further seven days; it will then keep for many months. The sides, when they are in the curing cellar, are piled one on the top of the other so as to save room as much as possible.

When sides are considered cured they are "struck," that is to say, the piles are dismantled and the cured sides of the meat are placed on a sparred table called a horse, and any pickle and salt which may be adhering to the sides, escape. The sides are then passed through an opening in the cellar wall or are carried through the door, and are washed immediately in a solution of water and dry antiseptic. They are then wiped with wrappers so as to remove all slime, and the bacon will then be ready as green bacon. It may then be dried to pale dried bacon in the drying rooms, or it may be first of all dried and then smoked as smoked bacon, but it will be ready for the market in any of these conditions.

There are, of course, in addition to the various different kinds of bacon and hams made, many other bye-products in a bacon factory such as lard, sausage, black pudding and the various goods which are made from the offal, all of which contribute to the general profit. It would be impossible in an article such as this to give detailed descriptions of all these processes. The brief outline which has been given above will serve to indicate that there is

THE LARD HOUSE. TRALEE CO-OPERATIVE BACON FACTORY.

Sausage Department. Tralee Co-operative Bacon Factory.



VIEW IN SLAUGHTERING HOUSE SHOWING SCUTTLING TANK, ETC. TRAI EE CO-OPERATIVE BACON FACTORY.

Chill Room. Tralee Co-operative Bacon Factory.

The Engine Room. Tralee Co-operative Bacon Factory.

Scalding and Singeing House. Tralee Co-operative Bacon Factory.

nothing very mysterious or difficult to learn in the bacon curing business, and really when it is considered how much it means in the success of agriculture, it is to be hoped that those in Cape Colony who are interested in this particular branch of it will see that it is well considered in future. There is now available, under the name of "Douglas's Encyclopædia," a comprehensive work on the art of bacon curing in all its various departments, and this fact alone is an important one, as it will enable all who take an interest in this matter, and who wish to pursue it through its various technical details, to acquire such a knowledge as will enable them to conduct the business themselves if they should so desire.

LOUDON M. DOUGLAS.

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MILLETS AND SORGHUMS.

THEIR USES AND PROSPECTS IN CAPE COLONY.

A REPORT ON CO-OPERATIVE EXPERIMENTS.

By Eric A. Nobbs, Ph.D., B.Sc., Agricultural Assistant.

In these days of good seasons following on a succession of disastrous years, there is special cause for farmers, realising the losses of the past and anxious to secure themselves so far as possible from a recurrence of such calamities, to take thought and protect themselves in every way possible that when the lean years come there may be something in store that at least their stock may be "sayed alive." To this end much is being done, but there can never be a sufficiency, and, therefore, the merits of those crops known collectively as millets deserve to be more widely known than is at present the case. The accompanying information has been gathered together for this purpose, and contains, besides general information and instructions for sowing, the experience of all those who, having received seed from the Department of Agriculture, have in return furnished reports of the results achieved.

For those unacquainted with their appearance, millets may best be described as resembling giant grass or miniature mealies or Kaffir corn. The fodder consists of a mass of long grass-like leaves, supported on an erect stalk, singly or in stools. The height of the plants varies from 3 feet 6 inches up to 5 feet, though if repeatedly cut a much greater aggregate growth is obtained. The leaf and stalk is succulent, palatable and nutritious, containing as a rule a considerable amount of saccharine juice, which renders it sweet and very attractive to stock. Owing to this and to misuse in feeding it in excessive quantities or in a wilted condition to hungry beasts occasionally, millets have been condemned as dangerous diet, but this is a misapprehension, the fault lying with the application and not with the plant itself. Millets are chiefly desirable as fodder plants, and as such are specially suited in a country such as this where the production during summer time of a large quantity of greenstuff suitable for making into hay or ensilage, or feeding direct either on the land or in the stable, is of so much importance. Millets are admirably suited for the production during good years of reserves of food for periods of drought as well as for the supply every year of succulent fresh feed in the height of the hot weather. Millets are to be regarded not as a primary crop like lucerne, wheat or mealies, but rather as a supplementary crop or a catch crop, being of very rapid growth, not only tolerating but requiring considerable heat for their best development, and at the same time drought resistant, though utilising to great advantage whatever water they do get.

Millets occupy the land for but a short time, and are useful as a summer fallow crop when sown in drills and cultivated at intervals with a horse hoe, thereby giving opportunities for killing the weeds, or, if sown broadcast, choking by their dense foliage the growth of weeds on foul land. Millets may conveniently be used as a substitute for mealies where that crop is not easily grown, as is often the case in our higher districts and throughout the Western Province. If cut young, several crops may be harvested during the summer, and where there is no frost this crop may even become perennial; it can with advantage also be used for pasturage if required. Millets are essentially summer crops, and do not stand the slightest frost, and grow slowly and weakly in cool weather. Millets possess a well developed but very shallow fibrous root system, as distinguished from the relatively deep rooting sorghums. This is characteristic of almost all quick growing plants, one consequence of which is that any manure they receive must be in a readily available form and applied at or near the surface, where the feeding roots are situated. Dung may be applied before ploughing, guano and artificial manures after ploughing but before the harrow is used to prepare the seed bed.

Millets will grow readily on a wide variety of soils, but do best on mellow loams rich in humus, that is, decomposing organic matter, while light sands are to be avoided. As a general guide it is safe to say that soils that suit mealies are also well adapted for millets. Naturally on richer soils and under irrigation the best results are to be obtained, and the different millets are not at all alike in their power of withstanding drought, nor in their choice of soil, nor further in their yields and rate of manuring.

The preparation of the ground for millets is as for mealies, indeed a corner of the mealie lands set aside for the culture of one or other of the millets for summer green feed is a practice strongly to be recommended. On stubble land, where the surface is loose and mellow, it might be sufficient, in place of ploughing, merely to break up the surface by passing a disc harrow over it a couple of times. Newly broken veld (braak land) may well be sown with this crop in preparation, for which purpose at the present time barley and occasionally rape is used. A fine and smooth seed bed, as for grass, is essential, on account of the small size of the seed.

The rate of sowing varies with the variety, and may approximately be taken as follows:—

	Rate of sowing in lbs. per acre.	
Variety.	Broadcast.	In drills.
Foxtail varieties	15—22	7—10
Broomcorns varieties...	15—22	7—10
Barnyard varieties	8—12	4—6
Hungarian varieties	10—*15*—20	8—12
White French varieties	8—15	7
Pearl varieties...	15—20	5—10

Less seed is used on good well cultivated land than on a poor soil, and less where a crop of seed is wanted than when grown for forage. Thick sowing keeps it fine and tall. The land should be got ready only immediately before sowing, so as to kill weeds and enable the millet to keep in advance of the next growth. Drilling is often recommended, but broadcasting appears to be quite as effective. The seed must be put in very shallow.

It is a good plan to sow millets at intervals of about three weeks, to provide continuous green food, as long as there is warmth enough to allow the seed to germinate and the crop to mature before the advent of the early frosts.

Millets when young are most sensitive to cold; sowing should therefore be deferred until the soil is thoroughly warmed through. While essentially

a summer crop, it is found that millets stand greater cold, and may consequently be grown at higher altitudes, than either the mealies or the sorghums. If sown in drills the crop can be materially helped by keeping the surface loose to kill weeds and retain the moisture. After cutting a first crop or grazing it down the whole ought to be harrowed over to loosen the surface. The millets require from 50 to 80 days to produce a crop of greenstuff, and 10 days longer if desired for grain. For feeding fresh to cattle and horses, young stock and sheep, for which it is extremely well adapted, millet may be cut as soon as the majority of the heads have appeared, and cutting may continue until the crop is in full bloom.

Millet is at its best when the seed heads or panicles have formed and are in the green pendulant stage. When cut too green millet excites a laxative action of the bowels; if too ripe it acts as a diuretic, and becomes unpalatable, tough and fibrous, and deteriorates in nutritive value.

For the purposes of hay or ensilage millet is cut somewhat later, up till the time of full flowering, after which time the leaves and stem rapidly lose their value, the nutriment all passing into the ears. In hay it is best to err on the green side, and for silage on the ripe side. For seed millet should be harvested when in the dough stage, not when dead ripe, else much will be shed on the ground.

Millet may be cut with the sickle, scythe or mower, or with a scythe blade fixed to a wooden sledge, and drawn by a horse along the edge of the standing crop, preferably in drills. The cut millet must lie in the swathe a few days to allow the stalk to dry out, otherwise it will be apt to mould and turn black. It may then be gathered into cocks to cure, after the manner of hay, and finally be built up in large stacks.

Millet, especially certain sorts, such as Hungarian and common millet, which have a propensity to stool out, are well adapted for grazing, especially for sheep and calves. Sometimes the first growth is grazed and the crop then allowed to run up into flower.

Millet is *par excellence* a green forage crop, a nutritious and attractive summer green feed for dairy cows, sheep and young stock. It is also excellently well adapted for turning into ensilage, or will make good, if coarse, hay. For such purposes it may with advantage be sown along with peas, beans or vetches, or made into silage along with any of these grown separately. Its rank thick growth renders it useful for destroying or keeping down weeds, while, if sown in drills, it admits of cultivation of the ground, and is so far a fallow crop. If allowed to ripen the seed furnishes excellent grain for pigs and poultry, especially for laying hens, but it is too useful as a fodder crop to be very likely to be largely grown for seed.

As stated, it is apt if green to have a laxative effect, if very ripe a diuretic action, and must, especially at first, be fed with care to all stock. It is well to mix it with other forage, and it should never be fed pure to horses, which seem most sensitive to its actions.

Millets have been found in all parts of the known world, and have more especially been used in eastern Asia as a staple food. Grain of the foxtail class of millets has been found in the ancient lake dwellings of Switzerland, and the culture of this variety can be authentically carried back 3,600 years in China, where it may have originated. Most of the known sorts have, through the medium of the Department of Agriculture at Washington, been introduced experimentally into the United States, and those that have succeeded are readily procurable from leading seedsmen in that country. Seed may also be procured in Australia, and of European sorts in Germany, France and England. Boer manna and Kaffir manna are obtainable in this Colony, and more readily in the Transvaal. Millet seed should weigh 30 lbs. per bushel, Barnyard Millets 35 lbs., and Pearl Millets 56 lbs.

Under the general name of millets is embraced a wide variety of related crops, amongst which, owing to their similarity, a great confusion of names

has arisen. The value and novelty of the crop has given rise to this unfortunate state of affairs. Combinations of names, confusion with sorghums and the introduction of adjectives such as early, sweet, mammoth, new, and so on, or mention of colour, such as black, white, grey, yellow, red, green and orange, has further complicated matters, till now there is an inextricable medley of ridiculous names. Botanically millets consist of members of the following families: —

Chaetochloa (Setaria)—Foxtail and German Millets.
Panicum—Barnyard Millets.
Pennisetum—Pearl Millets.
Andropogon (Sorghum)—Everlasting Millets.

The plants here referred to have been variously called millet, moha, manna, corn, grass, cane, or even sorghum, and to add to the mysticism nationalities are conferred upon them quite regardless of the facts concerning their native homes, and we have Siberian, Turkish, Californian, Dakota, Kaffir, Boer and a host of others. Actually, out of the score nominally introduced, there are only a dozen or so of distinct sorts really deserving a trial

The class of foxtail millets, *Chaetochloa italica*, is the form most generally cultivated in the United States of America, and is largely grown in central and southern Europe and in India. This species and its variety *germannica*, to which the Hungarian millets belong, furnish the best hay of any, withstand drought better, and persist under more adverse conditions and on poorer soils than any other sorts. In favourable conditions they are strong growers, and endure excessive heat and light, but are very susceptible to low temperatures and to frost. Foxtail millets have under experiment proved themselves amongst the best sorts, perhaps only second to the Japanese millets, which, if yielding less, appear to be even more rapid in growth and more resistant to drought, and equal as regards the quality of the forage produced. Hungarian millets provide the best crops of seed in America, and is much used for poultry feed.

The Barnyard Millet (*Panicum crus-galli*) has the special merit of succulence of stem, but is for this reason more difficult to cure than foxtail millets, but if well cured the hay is of the best.

The Broom-corn Millets (*Panicum mileaceum*) are the common millets of Europe, but not of America, and have been under cultivation since time immemorial. Though not such heavy yielders of forage as some of the other sorts, these are comparatively easy to cure into hay, and also excellent for ensilage. The broom-corn millets require less moisture than other sorts, and give a large yield of seed. They possess no laxative, diuretic, nor irritant properties. The name is derived from the distinctive open character of the head of flowers.

Pearl Millets, Egyptian or Cat-tail Millet (*Pennisetum spicatum*), belong to quite a different category. These are very popular in both Australia and in the United States of America, and are at home throughout Asia and in Japan. Pearl Millet does best in rich, loose, *moist* soil. It becomes coarse, woody and distasteful to stock if matured and allowed to come to seed. The leaves dry with difficulty, so that it is better suited to silage than for hay, and in this form yields enormous crops of succulent fodder. If cut young several crops are obtainable. It is commonly sown in drills 3 feet wide. The Kaffir manna (but not the Boer manna) appears to belong to this class.

Everlasting Millet, Alleppo Millet, or Johnson grass (*Andropogon halepense*) possesses different reputations to the others. This plant was introduced into the United States some twenty years ago, and also into Australia, where it was recommended as a marvellous drought resistant fodder

grass. But in orchards and other cultivated and irrigated lands it soon spread to such an extent as to be regarded as a pestilent weed, and in some States legislation for its eradication was resorted to. Johnson grass thrives on rich, moist soils, where better crops, such as lucerne, may be grown. It spreads by jointed underground stems, and once established, is difficult to eradicate. While undoubtedly useful in its proper place, and as a permanent pasture grass in situations where it is not likely to cause trouble, yet on the whole it cannot be advocated for trial here. It cannot be destroyed satisfactorily by poisons; ploughing up in hot, dry weather or again just before severe frost is the best mode of destruction. It spreads readily from seed also. It is native to the tropics of the Old World, and is found wild in Cape Colony, where, however, it never has become in any measure a weed as it is reported to have done elsewhere.

Teosinte, or Maud's Wonder Forage Plant or Regina Alta, Euchloena (*Reeana luxurians*) is another plant of which most exaggerated and misleading accounts have from time to time been published. It is only suited to very warm regions, and in view of the frequent disappointments of the past, cannot be recommended for purposes of trial.

The following notes, being based on actual experience in the Colony, are deserving of the closest attention:—

Japan Barnyard Millet.

It would be difficult to imagine more successful results than the reports on this crop show. The failures are few and unimportant. The reports, though not yet numerous, are from very widely separated parts. Evidently Japan Barnyard millet has given general satisfaction, and deserves to be widely known and largely cultivated. These reports are confirmed by the trials at the Experiment Stations at Robertson and Knysna, two completely different situations, where this and Japanese millet, apparently the same thing under a slightly different name, came out together as by far the best of all the millets and sorghums tried. In the Transvaal, at the Pretoria Agricultural Experiment Station, results bearing out these conclusions in a remarkable manner have been obtained, this millet being regarded as one of the very best, equal in quality, early and hardier against drought than Boer manna, though yielding a somewhat smaller return in that particular instance.

East Griqualand (Mr. D. B. Menne).—Sown 23rd September. Result: Good. 160 lbs. from 4 lbs. seed. A splendid crop and will pay well, and is very suitable to district.

Tembuland (Mr. G. B. Hoole).—Sown 6th November, 1906. Result: Good. Sown thickly in drills on unirrigated land. Reaped end of January. Yield nearly two sacks of seed from 4 lbs. sown. Grows exceedingly well, and stooled out to such an extent that there was no space between the rows when in ear, although 3 feet apart. Have sown a paddock of rich soil and will report during our dry winter.

Molteno (Mr. J. H. Vorster).—Sown October, 1906. Result: Good. Sown broadcast on unirrigated land. Reaped beginning April. Yield 100—1. Very suitable and will pay well. Horses and sheep are very fond of it. Has heavy leaves. A very soft forage when ripe, and a good seedling.

Calvinia (Mr. H. Buhr).—Sown October, 1906. Result: Good. Can recommend it. Gave better results as green forage than barley.

Beaufort West (Mr. Paul Nel).—Sown 2nd October. Result: Good. Grew splendidly when about 2½ feet high, nipped by frost. Horses very fond of it. Am sowing considerable quantity next year.

King William's Town (Mr. W. E. Haynes).—Sown 15th October. Result: Bad. Only a few seeds came up and these did not thrive.

Alexandria (Mr. J. Daverin).—Sown 28th June, 1905. Failed. (Wrong season.—E.A.N.)

Somerset East (Mr. R. H. A. Bowker).—Sown 4th October. Result: Good. Will pay as a fodder crop, and will make good hay.

Stellenbosch (Principal, Elsenburg).—Sown 4th November. Result: Fair. Yield 1¼ tons per acre. Worthy of a further trial. Suitable to district.

Bredasdorp (Mr. D. P. du Toit).—Result: Bad. Frosts kill it in winter and in summer it is too dry.

Villiersdorp (Mr. C. Lange).—Sown August. Result: Good. A very fine crop, and will pay as a green fodder. I can highly recommend it for the district.

Caledon (Mr. J. J. de Villiers).—Sown 19th October, 1906. Result: Good. Sown very thickly (as seed was damaged considerably) in drills on irrigated land. Apparently healthy but greatly damaged by birds. Not harvested. Very promising and worthy of a further trial.

Mossel Bay (Mr. J. D. Beneke).—Sown 20th December. Result: Good. Grew to about 2 feet in same number of months. Makes a good green fodder. Reaped 24th March. Yield 50—1.

Moorreesburg (Messrs. C. Starke & Co.).—Did not germinate.

Stellenbosch (Mr. W. C. Winshaw).—Sown early November. Result: Excellent. This fodder obtained 1st prize at Stellenbosch Show. Is suitable and will pay very well in this district. Of the three millets which I planted, this did by far the best, that is, for combined fodder and chicken food. The Pearl stooled very well, and gave great weight of fodder, but is inclined to be tough on the stalk. The so-called ladybird attacked in force when crop 6 inches high, but the plants after a slight backset outstripped the pest.

Pearl Millet.

The very promising character of these reports, which speak for themselves, at least justify continued and extended trials. Several experimenters seem to have tried in the wrong season. This class of crop is essentially a summer one, requiring heat to start it, doing well in comparatively dry soil, and, of course, not capable of withstanding any frost.

Albany (Mr. F. S. Tuberville).—Sown 21st September and 31st December. Result: Good. Sown broadcast on unirrigated land. First sowing was too late: seed came up well, but only grew a few inches. That sown in December has come on vigorously and stooled out well, each root giving a number of good sized heads (about 12 inches long). Seed now forming promises well. The plants have lots of room, as the seed this time did not come up very well, possibly owing to having been kept over till this season. I consider it suitable and will pay in this district.

Mossel Bay (Mr. J. D. Beneke).—Sown 20th December. Result: Good. Excellent fodder and much better than the ordinary grass. Reaped 24th March. Yield 50—1.

East Griqualand (Dr. G. R. Watson).—Sown 19th December, 1906. Destroyed by insects.

Hankey (Mr. E. W. Kirby).—Sown 15th September, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Reaped 15th January, 1907. Yield 700 lbs. hay from 12 ozs. of seed. Very suitable for district and will pay well. Should be sown thickly and in drills 12 inches apart. First cutting in about 90 days, just as the heads appear, and second cutting will be fit in another 90 days. Stands dry weather very well. Should prove a valuable forage crop. All animals like it.

Stellenbosch (Principal, Elsenburg).—Sown 4th November. Result: Fair. About two tons to the acre. Worthy of a further trial. Suitable to district.

East Griqualand (Mr. R. J. Lake).—Date not given. Won't stand frost; otherwise grew well.

Alexandria (Mr. J. Daverin).—Sown 28th June. Failed. (Obviously the wrong season.—E.A.N.)

Cape (Mr. F. Rahmer).—Sown 29th November. Result: Fair. Weak in some parts, but thick, and as high as 4 feet in others.

Cape (Mr. J. Smyth).—Sown 18th November. Result: Good. Grew well from start to finish; cut crop three times; fed to horses. Sown on poor land.

Bredasdorp (Mr. D. P. du Toit).—Result: Very good. Very healthy for ostrich chicks in early summer when green grass is scarce.

Moorreesburg (Messrs. C. Starke & Co.).—Did not germinate.

Calvinia (Mr. H. Buhr).—Sown October, 1906. Can recommend it. Does better than barley as a green forage.

Hungarian Millet.

While doing decidedly well in some instances, this millet seems to be inferior to others which have been tried, hence may be discarded in favour of the more generally successful sorts. This conclusion is again confirmed by results obtained at Pretoria, where, compared to a number of other sorts of millets, this variety was one of the very poorest.

King William's Town (Mr. W. E. Haynes).—Sown October 15th. Result: Good. 200 lbs. from one-eighth acre, partly damaged by heavy rain, the remainder grew about 4 feet high; healthy, suitable, and will pay in this district.

East Griqualand (Mr. D. B. Menne).—Sown 22nd September. Result: Good. Will pay as hay crop. 177 lbs. seed from 4 lbs. Not as good as Japan Barnyard Millet.

Alexandria (Mr. J. Daverin).—Sown 28th June. Failed (Wrong season.—E.A.N).

Stellenbosch (Principal, Elsenburg).—Sown 4th November. Result: Bad. Failed miserably.

Bredasdorp (Mr. D. P. du Toit).—Sown May and June, 1906. Did not germinate.

Caledon (Mr. J. J. de Villiers).—Sown 19th October, 1906. Result: Good. Sown in drills fairly thick on irrigated land. Satisfactory and worthy of a further trial. Rather delicate and does not give such strong plants as Japan Millet. Moreover, they grow more thickly up. May account for more stunted growth. Damaged by birds. Not reaped.

Moorreesburg (Messrs. C. Starke & Co.).—Sown 13th June, 1906. Seed did not germinate.

Calvinia (Mr. H. Buhr).—Sown October, 1906. Result: Good. Can recommend it. Does better as green forage than barley.

Kubusie (Mr. W. A. Robinson).—Sown 20th December, 1906. Result: Good. Sown thinly and broadcast on unirrigated land. Reaped 6th March. Yield 37½—1. Suitable for district, and I think it will pay as a fodder. This crop did very well considering the poor soil. Seed was mixed (White and Red). I prefer the White as it has larger heads. Have picked some of it out for seed purposes. Stock seem very fond of it when green, but straw gets very hard if allowed to ripen. Sheds seeds somewhat, and is much troubled by birds.

Cat-tail Pearl Millet.

The reports so far received are not sufficiently numerous to justify any conclusion on the matter, but it seems safe to assume that it is not so desirable as certain other kinds, hence, however good, need not be further tried since we have more promising kinds.

East Griqualand (Dr. G. R. Watson).—Sown 19th December, 1906. Destroyed by insects.

Vryburg (Mr. D. Robertson).—Sown: No date given. Result: Good. Millet is a good forage and seems to be a heavy cropper, and can be cut twice in the season.

Worcester (Mr. F. G. Strangman).—Sown 19th December, 1906. Result: Fair. Nearly 3 lbs. sown December, 1906. Ten rows each 20 yards long, 2 feet apart, on vlei ground trenched 18 inches deep, with a little stable manure dug into the surface before sowing seed. (Sowed sorghum and vetches alongside in the same way and at the same time). The millet sent me by the Agricultural Department is almost the same in appearance as a seed sent me by a friend from Kimberley, called there Nyouti, said to come from Rhodesia, trials of which have been made in August and November. The Millet is now (March 5th, 1907) from 1½ to 3 feet high, just beginning to shoot out its ears; as only one-third of the seed came up, it will not return enough to pay for the cultivation. I don't say it won't if planted in an old garden, the stem is thinner than either mealie or sorghum, but develops a hard caney stem early. It stools little.

WHITE MILLET.

Only one report is to hand on White Millet, and that not very encouraging, which tallies with the opinion formed of it at the Experiment Stations.

East London (Dr. J. Barcroft Anderson).—Sown 18th December, 1906. Result: Fair. Seed ripened unevenly. Crop appears to have been dwarfed by cold winds. A quick return for 46 days' growth. Yield 12,000 lbs. per acre—a less yield for that period than lucerne, which, when established, gives the same weight of green food in 30 days. Sown on unirrigated land exposed to winds and sun. Return of seed per acre, 656½ lbs. Crop ripened unevenly so that at the time of reaping some of the seed was over-ripe and some not quite ripe. Millet when fed green to stock has a laxative effect, but this will probably be lessened by its being sundried or turned into ensilage.

A REPORT ON SORGHUM TRIALS THROUGHOUT CAPE COLONY, WITH CULTURAL NOTES.

By ERIC A. NOBBS, Ph.D., B.Sc., Agricultural Assistant.

To most farmers the word "Sorghum" will occur as a new name, but it is in no sense strange, since certain forms have long been known in Cape Colony, and indeed some originated in South Africa. The word "Sorghum" is used to embrace a large number of cane-like grasses having a general habit resembling mealies, but with loose panicles of seed in place of the familiar cob, and growing to a height of from three and a half to over eight feet.

The great merit of sorghum lies in its great production of foliage, admirably suited as green food for cattle. All the sorghums contain in their juices more or less sugar, hence possess a sweet taste, rendering them very attractive to every class of farm livestock. The varieties of sorghum best suited for forage are hardy, rapid in growth and quick in maturing, up standing, not coarse and woody and soft seeded; and provided these qualities are pronounced, then the sweeter the better it is. Sorghums require essentially a hot climate, and supply succulent food in the middle of the hot and dry weather, tolerating to a remarkable extent hot, parching winds and drought, but succumbing at once to any sign of frost, and for this reason are apt to be injured if left too long or sown too late in the season. Though liable to be later than mealies, they usually give a heavier yield per acre of fodder. Abundant yield is to some extent counterbalanced by a heavy stalk, and in this respect sorghum is inferior to millets, than which it is also weight for weight less nutricious. As compared to millets the sorghums are much more deep-rooted. But amongst sorghums there is a remarkable variety of forms, and they differ very much one from another as regards appearance and habit of growth, the amount of sugar they contain and the length of growing season. Even the same kind is apt to show considerable variation according to the soil on which it is sown, the time of sowing, water given and climate. Allied to this peculiarity is the property of rapidly adapting itself to new conditions. In its early stages it grows very slowly, and unless looked after is apt to be choked with weeds. On ripening also it diminishes in feeding value the bulk of the nutrient matter becoming concentrated in the grain.

Of the numerous sorts introduced at different times there are now about a dozen established in general use in the United States, to which it was first introduced in or before 1810 under the name of Guinea corn. Sorghum was widely known by the middle of last century. It is supposed to have originated in Equatorial Africa, from which our native forms Kaffir Corn, Zoetstronk and Nyouti are probably derived. Different sorghums form the staple farinaceous food of vast sections of the human population and their livestock in Africa and Asia, particularly in tropic parts, is largely and successfully grown in Australia, especially in the warmer and drier regions.

Unfortunately we possess to-day a bewildering number of so-called varieties of the Sorghum tribe known by over two hundred different names, although not by any means representing the same number of forms. Much confusion arises from this cause, which is due to a reprehensible carelessness, not to give it a worse name, on the part of the dealers and others not adhering to the original names. According as they contain more or less sugar so they have been grouped into two great classes, the saccharine and the non-saccharine sorghums, though all are included under the one botanical appellation of Andropogon sorghum (*Sorghum saccharatum*).

To the first group belong the sweet sorghums or sugar canes used in more tropic countries than ours, such as Natal and the West Indies, as a source of sugar. Amongst them are many forms well suited for feeding to stock in all forms, and on account of its sweetness, animals eat the stalks as readily as the leaves. Imphee, our Zoetstronk grown by the Kaffirs, is one of the best known forms suitable for forage purposes, and of its suitability to certain large sections of Cape Colony there is fortunately no question. It only requires to be systematically cultivated by our white farmers in place of being left to the desultory efforts of the native. Farmers' Friend has proved one of the most useful fodder crops of Australia, and is equally suitable to this country. The Amber canes and Orange canes are also valued forms of which a number of varieties exist, of which Undendibule Cane is a good type. Compared to the other varieties, the sweet forms of sorghums are generally considered more in need of rich ground and favourable conditions for the development of the sugars. They are also more slender and more liable to lodge than the other more woody stemmed sorghums, especially when thickly sown.. On the other hand they stool out well and yield heavy crops.

The non-saccharine sorghums, the second group, do better than sweet sorghums on comparatively poor land, but the stalks are not readily eaten especially if ripe. They are more appreciated in the United States of America than in the Australian colonies, where the sweet forms are preferred. Both sorts stand drought more or less equally well. Red Kaffir Corn, so readily procurable here, is highly valued in America, especially on poor and dry soils. It is there considered to be quite one of the best, and though possessing abundance of leaf, the stalk is regarded as somewhat heavy and coarse. White Kaffir corn is considered generally inferior to the red, though still amongst the best of all sorghums, yet less sweet, less succulent, lighter in yield and later than the red form. These American estimates are interesting, and show a closer study of the plant than they appear to have received from us. It is added also that Kaffir Corn is singularly amenable to improvement by the simple processes of selection at harvest time. Kaffir Corn is also highly regarded in Australia. Nyouti, largely grown by the natives in Rhodesia, is also an indigenous form of which much may be made use of in the future. Other forms which are well known are the yellow millo maize, Egyptian rice corn, Durra Dhoura, or Dari of India, all different names for one and the same thing; also the

closely allied white millo maize, chicken corn, etc. The broom corn, which, owing to its particular use, deserves separate treatment elsewhere, also belongs to this category.

Sorghums will thrive on any soil that would be considered suitable to mealies, but do best on rich, well-drained sandy loams, and should produce with less rain or irrigation about a third more green stuff. As a rule only sufficient to supply next year's seed is allowed to ripen owing to the difficulties of protecting it against birds. Preparation of the soil is as for mealies; sorghum being deep-rooting, deep ploughing is indicated, while on account of the slow early growth, care must be taken to have the land free of weeds.

Manures are seldom applied to sorghum, except on very poor soils. Well rotted stable manure is the best, and if artificials are used, phosphates and potash are beneficial, but comparatively little nitrogen is required.

In order to make the early growth as rapid as possible, sowing should be deferred till the ground is well warmed, and after all danger of frost is passed. Sowing broadcast 15—25—30 lbs. of seed per acre is used. A bushel of sorghum seed weighs about 30 lbs. A mixture is often sown in Australia of sorghum with millets, peas or beans, and is highly spoken of as a fodder. In such case equal quantities of sorghums and peas or beans is recommended, and should be thickly sown. Sorghums may with much advantage be sown in drills, using a hand-sower for the purpose, or a horse-drill with three spouts only in operation. From 3 to 7 lbs. per acre will then suffice. So far as can be inferred from foreign experience, it is best to sow sorghums immediately after mealies have been put in when the soil and air are warm and all growth active. It is a good plan to sow in succession, so that the green food will come on by degrees and not all at once. During growth all that is required is to keep the soil well pulverised and free from weeds by occasional hand or horse hoeing.

Sorghum takes from 50—80 days to mature. It is cut when in bloom, or very shortly thereafter. If two crops are to be taken, the first is cut as soon as the majority of the heads are formed, or even earlier. For seed, the heads, when ripe, are cut off from the standing plants or from the dried sheaf, and threshed separately, as the stalk would be too bulky to pass through the machine. The yield of seed varies from 25 up to 75 bushels per acre.

The crop may be cut with scythe, sickle or mower. If not required for immediate use, which is its chief value, it may readily be made into hay or ensilage. In making hay, it must lie for a time after cutting for the stalks to dry out, else they are apt to turn black and mouldy, and spoil the whole. The stack must be well thatched to keep the rain out. From what has been seen, it will readily be appreciated that the yield varies very greatly, and may be anything from 5—*14*—20 tons per acre of green stuff or silage equivalent to 3,000—*8,500*—12,000 lbs. of hay per acre.

As will have been gathered from the above remarks, sorghum is to be recommended as a midsummer crop, suited for soiling (feeding fresh out to stock) for hay or ensilage, and it may be given to every class of farm live-stock, especially for growing animals and milk producers. It is fattening and nourishing, and when green well suited for feeding for milch cows. It may be pastured from as early as four weeks after sowing, continuously over a large patch, not paddocked, as continuous pasturing gives in this instance better results than alternate close grazing and complete rest. After grazing for some time, sorghum may be allowed to grow up, which it does thickly from the stools, and the final crop be harvested in the ordinary manner.

It must not be forgotten, however, that sorghum, like lucerne, if fed to hungry stock unused to it may produce hoven (op-blaas). Leaf wilted by the

hot sun, or when frost-bitten, is considered specially dangerous. Stock must be gradually accustomed to it, and should not be allowed to gorge themselves when hungry. Avoid feeding sorghum pure to stock, especially to horses. It will thus be seen that sorghum is a very easy crop to grow, deserving to be better known and to be tried everywhere in Cape Colony, wherever green fodder is valued, or where a supply of food for seasons of scarcity has to be laid up during good years, such as are now with us.

Remarkably few reports on these crops have been received, and there is a lack of discrimination as to the varieties tried. The bulk of the seed sent out consisted of Planters' Friend, Early Amber Cane and Undendibule Sugar Cane. This perhaps explains the varied nature of the reports. A fair inference seems to be that sorghum requires considerable warmth to start it. As it grows slowly at first if sown too early it gets a bad start, and weeds will choke it. It succeeds with scanty supplies of water, but a touch of frost is fatal to it.

Stellenbosch (Mr. W. L. Steele).—Sown 20th September, 1906. Result: Good. Sorghum produces more milk than mealie and does well wherever the latter thrives, and will certainly pay from my own experience.

Stellenbosch (Messrs. O. & W. Barry).—Sown November and January. Result: good. Will pay, but must be sown later than mealies.

Paarl (Mr. W. McMillan).—Sown end of October. Result: Fair. Should have sown earlier. Seed germinated badly, but the few plants that grew stood the drought better than the mealies did.

Paarl (Mr. J. A. Louw, Hermon).—Sown 5th October. Result: Good. On sandy brak land, unirrigated, broadcast. Very good for horses and cattle. Grows well; stands drought, and will pay. Sow not later than October.

Hermon (Mr. Cecil de Villiers) —Sown: Date not given. Result: Bad. Bad seed. About two seeds came up.

Worcester (Mr. F. G. Strangman).—Sown 19th December, 1906. Result: Poor. Only about one-quarter of the seed came up. Is 5 to 6 feet high with 5 or 8 stalks in a stool, and is making a nice cut of green forage.

East Griqualand (Mr. D. B. Menne).—Sown 20th September and 24th December, 1906. Result: Fair. Sown broadcast on rich black soil. The first gave a good crop of fodder, dry, which stock like very much. It was just out of flower when the frost came. The second lot was only about 3 feet 6 inches high and not in flower. Mealie fodder is more suitable for us.

East Griqualand (Dr. G. R. Watson).—Sown 19th December, 1906. Destroyed by insects.

East London (Mr. I. B. Anderson).—Sown December, 1906. Seed sown about Christmas time, and close together, whereas the natives sow their Kafir Corn much earlier along with mealies.

Aliwal North (Mr. C. G. Hands).—Sown 5th September. Result: Fair. Even though we had such a dry summer the crop came on excellently, some stools standing 10 feet high and sending out 6 to 8 stalks, each with a very fine head. On April 6th had very severe frosts which killed practically everything. The dry stalks make good feeding for sheep and cattle. Slow grower. Not suitable here.

Kimberley (Mr. H. Symonds) (*S. Saccharatum*).—Sown October, 1906. Result: Good. Grew like Kafir Corn and did not give a heavier crop than the Kafir Corn, but the grain ripens earlier; was untouched by the locusts and little troubled by birds. After removing the seed the stalks were chapped and put into a silo, but did not appear to be much sweeter than the Kafir Corn.

Kimberley (Mr. H. Symonds) (Amber Sugar Cane Sorghum).—Sown October, 1906. Result: Fair. This sorghum grew to the height of 10 feet. Locusts appeared at this stage and destroyed most of the grain, not eating so much of it but ripping off each grain and hardly touching the leaves of the plants. The plant when matured looked like broom corn and unlike the Amber Sugar Cane grown in Australia. The stalks were woody, with a dry pithy centre, and not the least bit sweet. I do not care for this sorghum, and will not sow same again.

CORRESPONDENCE.

Correspondence and contributions are invited on all subjects affecting the Farming Industries of South Africa, suggestions for consideration or hints as to improved methods being particularly welcome. It should in all cases be distinctly understood that we do not hold ourselves responsible for opinions expressed or statements made.

Questions are also invited. In this department, every endeavour will be made to procure the desired information for publication in the next issue, but this cannot be guaranteed in the case of letters received after the 20th of the month. Should a correspondent deem his enquiry urgent, he should say so, and an answer will be returned *through the post* as soon as possible.

All letters or contributions should be plainly addressed: "The Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town"; they should be written on one side of the paper only, and be accompanied by the name and postal address of the writer, not necessarily for publication, but as a guarantee of good faith. A *nom de plume* may be attached for publication.

Gallziekte on Burnt Veld.—Wanted: A Movable Kraal.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have a sick calf which I expect will be either dead or all right before this letter will appear or I can get a reply from you. My object in writing is to get advice from you and others for future guidance.

The calf is about nine months old, a heifer. She grazes during the day on burnt-off veld which is now beautifully green with young grass. She came home in the evening three days ago, as far as I could see, in good health and eager to suck. Next morning she was found prostrate, not moving a limb, just breathing gently. Two neighbours and myself came to the conclusion that she would be dead in an hour's time. As we could not make out what was the matter I gave it a teaspoonful of laudanum, an ounce of brandy and a cup of water. Two hours later I found the calf on her legs, head drooping, keeping her head to right side with nose on ground. At noon I gave her a cupfull of raw linseed oil and an ounce of brandy. She was never blown. She passed manure naturally. The following morning I gave her ¼ lb. cattle salt. All this time the calf would not suck. I poured milk and also boiled bran water down its throat several times a day. It is the third day to-day and there is not much difference either way. The salts did not *purge* her, but she passed manure in a satisfactory way. If anything, I notice that her eyes are livelier. She holds up her head. But when she walks against a post or anything, puts her shoulder against it, and uses the little strength she has in pushing forward. Would like to hear the experience of others, also treatment.

Will also be glad if any of your readers who have experience will give me a good and feasible plan for making a kraal for, say, 600 small stock. The object is to shift about with the stock to different parts of the farm, and the kraal must be so that a few men can take it down and shift it per wagon to the spot where it must be put up by them in a short time.

J. F. PENTZ.

Vryburg, 9th September, 1907.

From the symptoms described it would appear that the calf was suffering from an attack of Geilziekte, a not uncommon occurrence amongst stock grazing on green, soft grass which has sprung up on burnt veld. In such cases it is supposed the poisonous gases are rapidly formed in the contents of the stomach, which, when absorbed into the blood, produce drowsiness followed by delirium and death from coma. As regards treatment, the disease is generally so rapid in its course that

there is little time for any, but in cases where there is no tympany a doze of Calomel followed by a dose of Epsom Salts is beneficial; cases in which tympany is acute Bicarbonate of Soda or Turpentine in ounce doses are recommended.—J.D.B.

Movable kraals are constructed by some farmers by fixing laced wires on fencing poles in such a way that the whole contrivance can be taken down, rolled up like netting, poles and all, and moved from place to place on a wagon.

Burned Veld and Young Stock.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I shall be glad to have your opinion as to what effect feeding on the young grass which comes up after veld burning has on small stock. The opinion of a number of farmers is that if sheep and goats in lamb feed on this young grass they are liable to throw dead lambs.—Yours, etc.,

ENQUIRER.

Hoopstad, O.R.C., September 2.

Such pastures frequently produce serious effects in stock, but they mostly take the shape of digestive derangements. The shock to the system might possibly affect them also in the manner indicated. Perhaps some of our readers can give fuller particulars.

The Rearing of Goslings and Ducklings.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have given some geese to natives near the sea coast to breed "on halves," and they can keep all feathers. The food the geese get is mealies and Kafir corn. The place is dry, and the geese get only water in a dish. They look well and breed well, but *no goslings can be reared.* They look fresh and well in the morning, follow their parents about, run about and frisk about quite jolly, and then tumble over and are dead! On the coast there is lots of vegetation, and there is always green grass. What can be the reason, is it the heat of the sun or the food? Can you advise? and also send me a book on the rearing of ducklings and goslings, and I will remit you the price. Years ago I had a lot of ducklings (eighty odd) near Cedarville on the banks of the Umzimvubu River (*so* that was not a dry place), and the same thing happened, they tumbled over and died. I did not rear one.—Yours, etc.,

W. VON MEYER.

Kokstad, September 17th.

It is difficult at this distance to say exactly what is affecting the ducklings and goslings mentioned. Though mealies and Kafir corn are scarcely an ideal ration for them, it does not appear from the description that they are suffering from digestive derangements. What seems most probable is that they are being poisoned by eating some noxious weed or other. There are several poisonous weeds which grow freely in the neighbourhood of native kraals that would account for the losses mentioned. A pamphlet was forwarded by post, "Poultry in South Africa."

Blindness in Incubated Ostrich Chicks.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Can you or any of the readers of, or contributors to, the *Agricultural Journal* supply the necessary information as under:—

1st. What is the cause of total blindness in ostrich chicks when just hatched by an incubator?

2nd. Is there any remedy at all that could be used to enable restoration of sight.

I have had several chicks hatched this season that have been totally blind. Otherwise they have been strong, healthy and well developed chicks. I may state that I

have had a considerable number of years of practical experience in incubating both with Cypher's Model and Hassis' Patent Incubators, and have been very successful, but am at a loss as to the cause of the blindness. I shall be glad of any reply that may throw some light on the subject.—Yours, etc.,

ENQUIRER.

Salem, September 17th, 1907.

Further correspondence on the subject would be welcome. Have any of our readers any experiences to offer?

Poison for Jackals.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I would be glad to hear what the general opinion is with regard to the pink strychnine supplied by the Government at low rates. I have put down some 500 pills in the last four weeks, but all I have found dead are two wild cats. I make the pills of meat about the size of a turkey's egg or else I take a mouse or a small bird and put about as much poison in as I could get on to a tickey. But the jackals still nightly proclaim the fact that they are at large seeking what they may devour. Yet the pills always disappear. Several other farmers around here have had the same experience. Is the strychnine below full strength, or do we use it wrongly?—Yours, etc.,

FARMER.

Middelburg, September 16th.

The strychnine can easily be tested by our correspondent. So far as we know it is of full strength. The fault probably lies in the handling.

Springbucks.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I think the record I am sending you will take some beating. In 1904 I bought a pair of young springbucks. Unfortunately the ram got hurt bringing him home and died. In December of the same year I managed to buy another ram, and from these bucks I have had the following:—

2nd July, 1905.—Ewe kid.
18th January, 1906.—Ram kid.
1st August, 1906.—Ewe kid.
27th February, 1907.—Ram kid.
12th September, 1907.—Ewe kid.

The first ewe kid had a kid at the beginning of the present year which died, and she kidded again in August.

The one ram got very vicious, so I had to shoot him, but I have still seven bucks. —Yours, etc.,

WM. FROST.

Thibet Park, Tarkastad.

The Dehorning of Cattle.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Could you kindly give me any information concerning the dishorning of cattle or preventing the growth of horns in cattle. I have been told they are more docile when hornless and would therefore like to experiment on some calves, and, if possible, large cattle. Do you have to take precautions after the operation, or do you just let them run as usual? I shall be very thankful if you would kindly reply through the medium of your valuable *Journal* as it may interest others.—Yours, etc.,

C. C.

Indwe, September 13th.

You can prevent the growth of horns very easily when the cattle are young. So soon as you can feel the horn forming, cut away the hair, moisten the spots and take a stick of caustic potash and rub well on. This will prevent the horns forming. You can then let them run. Full-grown horns can be removed by an instrument specially made for that purpose, but this is another matter altogether and is not to be generally recommended. The best method is to prevent the growth as above.

Catching half-wild Ostriches.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Could not one of your readers give me some information on the following: —Would it pay any farmer to catch half-wild ostriches running in camps of about one hundred to two hundred morgen large, and could ostriches in a half-wild state be caught and handled without injuring them to such an extent that they would die. If so, please recommend me the best means of catching them Thanking you in anticipation for inserting this letter in your next issue.—Yours, etc.,

R. S. DE VILLIERS.

Porterville Road, September 24th.

A Prolific Boer Goat.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—A singular thing happened here the other day. A Boer Goat ewe of a Kafir had twin kids full-grown and healthy, and eight days after two more were born fully developed and healthy. All four were born in his kraal, and there is no possible doubt about the matter.

Have any of your readers heard or seen a parallel case; if so, I shall be glad to hear through your pages about it.—Yours, etc.,

C. S. ECKARD.

Richmond, October 2nd.

NOTES ON THE WEATHER OF AUGUST, 1907.

By Charles M. Stewart, B.Sc., Secretary to the Meteorological Commission.

A continuance of the high mean pressure of the preceding month, a mean temperature considerably above the average, with unusually bright warm days and average nights with severe widespread frosts during the first half of the month, a continued deficiency of rainfall amounting to only one-third of the normal, a few thunderstorms with some hail towards the end of the month, slight falls of snow at the beginning of the month, slight increase in cloudiness and in the number of fogs as compared with July, together with slightly stronger winds, chiefly easterly north of 30 ° S. Latitude and Westerly south of this parallel, a moderate number of gales, and a moderate number of duststorms, with an unusually large number of hot winds. of daily occurrence at one or more stations, were the most noticeable features of the weather of August.

Division.	Mean Rainfall (1907).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	2·82	8	5·94	12	−3·12	−53
South-West ...	1·20	5	3·24	8	—2·04	— 63
West Coast ...	0·57	3	1·44	5	—0·87	— 60
South Coast ...	0·83	4	2·16	6	—1·33	— 51
Southern Karoo ...	0·41	1	0·85	3	—0·44	— 52
West Central Karoo ..	0·07	1	0·48	2	—0·41	— 85
East Central Karoo ...	0·09	1	0·71	2	—0·62	— 87
Northern Karoo ...	0·01	1	0·52	2	—0·51	— 98
Northern Border ...	0·00	0	0·25	1	—0·25	—100
South-East ...	0·18	2	1·39	4	—1·21	— 87
North-East ...	0·01	1	1·17	3	—1·16	— 99
Kaffraria ...	0·04	1	1·22	4	—1·18	— 97
Basutoland ...	0·00	0	1·15	3	—1·15	—100
Orange River Colony...	...	...	0·69	2	...	..
Durban (Natal) ...	0·01	1	1·93	...	—1·92	— 99
Bechuanaland ...	0·00	0	0·36	2	—0·36	—100
Rhodesia ...	0·00	0	0·11	1	—0·11	—100

Precipitation.—The mean rainfall for August, based on the records of 339 stations, amounted to only 0·52 ins. on 2 days, being 1·04 ins. or 67 per cent. less than the average and 0·10 ins. more than what fell during the preceding month. It will be seen from the last two columns of the accompanying tabular statement that there was a serious deficiency of rainfall over each of the divisions ranging from 53 per cent. over the Cape Peninsula to absolute drought over the Northern Border, Basutoland, Bechuanaland and Rhodesia, as well as over the greater number of stations in the West Central, East Central and Northern Karoos, the North-East, and portions of the South-East and Kaffraria. The only divisions showing an increased precipitation, compared with July, are the Cape Peninsula, the South-West, the West Coast and the South-East, while the Southern Karoo shows the same mean as in the preceding month. Speaking generally, it may be said that drought, partial or absolute, prevailed over the whole of the "Summer Rainfall" area, whilst over the "Winter" and "Constant Rainfall" areas the mean rainfall was considerably less than half the usual amounts. A consideration of the monthly totals shows that of the 339 stations, 142 reported "Nil," 46 had a rainfall of 0·01—0·10 ins.; 64 had 0·11—0·50 ins., making

a proportion of 73 per cent. suffering from partial or absolute drought; 29 had 0·51—1·00 ins.; 34 had 1·01—2 ins.; 12 had 2·01—3 ins.; of the remaining 12 confined entirely to the Cape Peninsula, 3 had 3·01—4 ins.; 4 had 4·01—5 ins.; and 5 had between 5 and 6 inches, the largest amount recorded being 5·79 ins. at Bishopscourt, and the next 5·60 ins. at Waai Kopje (Table Mountain). Similarly the maximum amounts recorded in 24 hours were nowhere very heavy, as shown by the fact that of 329 stations furnishing details, only three (3) had more than 2 ins., the heaviest fall being 2·57 ins. on the 27th at Bishopscourt, the other two being 2·03 ins. at Newlands Reservoir, and 2·01 at Newlands ("Montebello") both on the same date (27th), on which day precipitation was heaviest for the month all over the Cape Peninsula. Of the remaining 326 stations, 11 had 1·01—2 ins., 173 had 0·01—1·00 ins., and 142 had "Nil." The rains on the 27th and 30th over the South-West of the Colony proved of considerable benefit to the crops which had been suffering from the partial drought of the three previous months. *Thunderstorms* of fairly wide distribution occurred on the 27th, but were more limited on the 30th. In all, 36 of these were reported on 5 days—2nd, 15th, 27th, 30th, and 31st. *Hail* was noted at 3 stations, on the 2nd and 27th. *Snow* was reported to have fallen at Richmond, Hogsback and Sutherland on the 2nd, Dontsah on the 3rd, when it was reported to have been heavy, the amount of rainfall noted on that morning being given as 0·20 ins. *Sleet* fell at 6 stations, on the 2nd, 3rd, and 29th. Only on 7 previous occasions since 1841 was the Royal Observatory rainfall for August less than that recorded this year (1·49 ins.), viz.: 1851, when it amounted to 0·59 ins.; 1860, with 0·92 ins.; 1867, with 1·36 ins.; 1868, with 0·69 ins.; 1884, with 1·16 ins.; 1898, with 1·37 ins.; and 1901 with 0·58 ins

Temperature, Cloud and Wind.—The mean temperature of all the stations was 56·1° or 1·6° warmer than usual and 2·9° higher than in July. This excess was practically wholly due to the day temperature (70·0°) being 3·2° higher than usual, while the mean night temperature (42·2°) was only 0·7° above the average. Generally speaking, the mean monthly temperature was slightly (0·1—1·0° above the average in the South West, although the excess at Disa Head (Table Mountain) amounted to 3·1°, whilst at O'okiep it amounted to as much as 5·0°. Along the South Coast between Cape Agulhas and Cape St. Francis it was 0·5°—1·5° lower than usual, as also at East London, whilst at a few stations in the interior it was practically normal. Over Basutoland and at Hopefountain there was a deficit of 1·5°—2·5° but elsewhere there was an excess of temperature, generally about 1·0°, but ranging from 0·6° at Hope Town to 3·6° at Evelyn Valley. The mean maxima were commonly above the average by 4·6° over the greater number of the inland stations, the excess decreasing, however, to 1—2 degrees in the Cape Peninsula, at Port Elizabeth and East London, and being converted into deficits of 0·5°—1·5° between Cape Agulhas and Cape St. Francis increasing to *minus* 2·4° at Moyeni and *minus* 2·8° at Hopefountain. The mean minimum temperatures exhibit certain peculiarities compared with the normals, which seem to be dependent on local conditions. Thus, whilst the mean night temperature at the Royal Observatory was 0·8° lower than the average the corresponding value for Disa Head (Table Mountain) was 1·6° highere than usual. Similarly with other stations distributed irregularly over the Colony. It may be stated in general terms that the mean minima were below the average by 0·1°—1·5° at most of the coast stations, the deficit increasing to as much as 5·2° at Aliwal North. The excesses over the normal varied from 0·1° at Simon's Town and 3·9° at O'okiep. There was an increase in the mean daily range (27·8°) of 3·1° compared with the average. The lightest temperatures of the month were most commonly recorded during two warm spells, on the 14th and 15th, and from the 23rd to the 28th; chiefly, however, on the 13th, 24th, and 26th, although maxima were also registered at isolated stations on the 17th, 19th, and 31st. The lowest readings occurred most numerously during a cold spell from the 3rd to 6th, also on the 10th and 11th, and at a few stations on the 1st, 22nd, 26th, 30th, and 31st, but most widely on the 4th and 5th. The mean of the maxima for the month at the various stations was 84·5° or 7·8° higher than in July, whereas the mean of the lowest readings was only 31·4° or only 0·9° higher than during the preceding month. There was thus an increase of 6·9° in the mean monthly range (53·1°) for August as compared with July. The highest reading of all the stations was 95·0° at Dunbrody on the 26th, and the lowest, 12·0° at Hanover on the 4th, showing an extreme monthly range of 83·0°. The mean warmest station was Port St. John's with 63·3°, and the mean coldest Hanover, with 47·9°, a difference of 15·4°. The greatest value of the mean maximum was 77·5° at Kenhardt, and the least value of the mean maximum 27·7° at Hanover. *Frosts* of great intensity were of widespread occurrence during the first 16 days, but were much more local and less severe during the last half of the month. In all 314 instances of this phenomena were noted on the 31 days, most numerously on the 4th, 5th, and 11th. Notwithstanding this, most of the stone fruits were in full blossom during the month, although, owing partly to drought, the prospects are not so good as last season.

The high pressure of the previous month continued during August, the mean reading of the barometer at the Royal Observatory being 0·05 in. higher than usual. The skies were clearer than usual (commonly by 10—20 per cent.) at all stations

except at Hopefountain, where there was a small excess of 4 per cent. The mean percentage of *Cloud* was 32, or 2 per cent. less than usual, but 5 per cent. more than last month. The mean proportion of sky obscured was mostly between 40 and 50 per cent. over the South-West and along the South Coast, decreasing to 30 per cent. at East London, but rising to 47 per cent. again at Port St. John's. At short distances from the coast the mean was mostly about 30 per cent., but at the inland stations this decreased generally to 15—20 per cent. The clearest skies were met with at Kimberley, where the amount of cloud was only 4 per cent., whereas Cape Point showed the greatest amount of cloud, viz., 63 per cent. *Fog or Mist* was slightly more common than during July, 80 instances of this phenomena being noted on 26 days, being of daily occurrence from the 16th to the end of the month, particularly on the 20th. 21st, 23rd, 24th, and 28th. No occurrence of this nature was noted on the 3rd, 4th, 8th, 10th, and 15th, this meteor being practically local during the first fortnight except on the 2nd and 13th. The prevalent *Winds* were Westerly to N.-Westerly, with frequent calms south of 30° S. Lat., but Easterly (N.E. to S.E.) to the north of this. At the Royal Observatory the prevailing morning wind was from N.N.W., while there was an excess of those blowing from West to S.S.E. All other directions show a marked deficiency, particularly N.W. and South, and winds from between N.N.E.—E.S.E., S.S.W.—W.S.W., and W.N.W. were entirely wanting. The mean force at 8.30 a.m. at the Royal Observatory was 1·19 on the Beaufort Scale, corresponding to a mean velocity of 8·95 miles per hour, or 2·8 miles per hour less than usual, whilst calms were exceptionally frequent. The mean *Wind-Force* of all stations was 1·51, corresponding to a velocity in the morning of 12·08 miles per hour, or 2·4 miles per hour greater than during July. The wind was reported as attaining the force of a *Gale* at 22 stations on 9 days, particularly on the 1st, 2nd, and 28th. *Hot Winds* were of unusually frequent occurrence and of wider occurrence than usual, being noted at one or more stations daily, particularly on the 26th, 1st, 16th to 20th, and 25th to 27th. *Duststorms* were noted at 14 stations on 7 days, viz., 1st, 2nd, 4th, 18th, 27th, 28th and 30th, but mostly on the 28th.

An *Earthquake Shock* was experienced at Schuilhoek (Division of Hanover) on the 10th.

OBSERVERS' NOTES.

KARNMELKS RIVER.—This and two preceding months have been very dry. This district badly in need of rain to save crops.

VRUCHTBAAR.—Very dry month till the rainfall of the 27th. The crops suffered severely, but have picked up fine after the rains. All early fruit in blossom; prospect of crops not so good as last season.

PLETTENBERG BAY.—Hot Berg winds the whole month.

UITENHAGE PARK.—The driest month since observations have been taken here—September, 1901.

THEEFONTEIN.—Frosts occurred from 1st to 20th. Clear, bright weather. Winds mainly North-Westerly. A few swarms of flying locusts noticed in neighbourhood.

THE MEADOWS.—Beautiful month, scarcely any wind. Crops looking well. Rain will do good. Stock doing well.

ALEXANDRIA.—Influenza prevalent. Crops suffering badly from drought.

FAIRHOLT.—No rain during month. A few clouds on about seven days. Sharp frosts.

HUXLEY (Stutterheim).—Grass is green on most farms, and stock doing well.

THIBET PARK.—With exception of two days, a nice bright month; severe frosts in early part of month; rain wanted now.

KOKSTAD.—Country dry and parched. Fruit trees in full bloom. Influenza very prevalent.

SLAATE.—First half of month frosty nights and calm weather, then more or less windy for the latter half.

GROOT DRAKENSTEIN.—The same weather conditions which prevailed through the greater part of June and July continued up to the end of this month, when a change set in on the 30th with a much-needed downpour of rain. The days were at times intensely hot and the nights cold, the daily range exceeding 40° on several occasions. Mean temperature 1·5° above average. Mean maximum temperature 5·3 above average. Rainfall 3·32 inches below average. Average rainfall, January-August, 27·64 inches. Total, 1907, January-August, 23·41. Deficit, 4·23.

STUTTERHEIM.—Most fruit trees in blossom. Veld looking well. Two deaths from plague in district during month.

KOKSTAD.—Weather very dry. Some severe frosts early in month. Fruit trees in blossom. Rain is needed.

QUEENSTOWN (Beswick).—High barometer. Warm month, 2 degrees above average. Day temperatures still higher night lower. Very calm; only three days of very high winds.

TEMPERATURE, AUGUST, 1907.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	64·1	47·3	55·7	81·8	15	40·6	6
Sea Point ...	63.6	42·4	56·0	82·0	15	43·0	5
Table Mountain (Disa Head)	58·6	45·1	51·9	78·0	25	35·0	3
Simonstown ...	66·4	52·3	59·4	86·0	15	46·5	3
Cape Town (S A. College) ...	65·8	46·8	56·3	84·2	15	40·0	4
Wynberg ...	66·4	46·9	56·6	84·5	15	39·0	4
Groot Constantia ...	63·4	47·1	55·2	84·0	15	41·0	4
Groot Drakenstein ...	69·0	42·0	55·5	86·1	14	32·2	5
Danger Point ...	60·9	49·0	55·0	73·0	15	42·0	5
Elsenberg (Agri. College) ...	65·8	42·1	54·0	82·5	14	32·6	5
Wellington (Hug. Sem.) ...	67·5	42·7	55·1	78·8	15 & 24	32·5	10
O'okiep ...	71·4	46·2	58·8	86·0	23	33·4	5
Dunbrody ...	78·8	40·3	59·6	95·0	26	26·3	5
Port Elizabeth (Emerald Hill)	68·0	52·7	60·4	90·0	26	43·0	3 & 4
Van Staaden's River ...	70·6	45·0	57·8	91·0	26	35·0	31
George (Plantation) ...	67·0	46·9	57·0	84·0	15	41·0	30
Cape St. Francis ...	65·0	50·9	57·9	76·0	15	44·0	11
Port Elizabeth (Harbour) ...	68·6	51·1	59·8	88·0	15	41·0	11
Heidelberg ...	71·9	40·7	56·3	87·0	15	31·0	5
Cape Agulhas ...	60·0	50·4	55·2	72·0	15	42·0	3
Uitenhage ...	75·7	41·9	58·8	93·5	26	32·0	11
Amalienstein ...	74·4	36·1	55·2	91·0	26	26·0	5
Hope Town ...	73·7	33·8	53·7	82·0	23, 24 & 25	19·0	4
Hanover ...	68·1	27·7	47·9	80·0	24	12·0	4
Murraysburg ...	69·9	32·4	51·6	81·0	23 & 24	17·0	3
Kenhardt ...	77·5	36·1	56·8	88·0	24	25·0	1 & 4
Kimberley ...	75·5	38·5	57·0	84·0	24	29·1	5
Sydney's Hope ...	71·3	48·1	59·7	89·0	26	35·5	4
Lovedale ...	76·3	40·7	58·5	91·0	26	26·0	5
Bedford ...	75·0	42·3	58·6	88·0	20 & 27	26·0	5
King William's Town ...	78·3	42·7	60·5	95·0	26	29·5	5
East London ...	70·3	50·1	60·2	89·0	17	42·0	6
Stutterheim ...	76·5	50·1	63·3	87·0	26	39·8	22
Evelyn Valley ...	69·3	46·8	58·0	85·0	26	33·0	3 & 4
Aliwal North ...	72·5	29·3	50·9	82·5	24	16·0	5
Rietfontein (Aliwal North)...	66·1	30·8	48·4	78·1	24	18·3	4
Queenstown ...	73·5	37·3	55·4	83·0	26	21·0	5 & 10
Port St. John's ...	75·1	51·5	63·3	94·0	28	41·0	26
Umtata ...	77·3	37·8	57·6	91·0	19	23·0	5
Tabankulu ...	72·9	42·6	57·8	84·0	19	27·4	4
Main ...	73·5	43·9	58·7	85·5	26	32·5	4
Kokstad ...	71·3	33·0	52·2	82·0	19	20·0	4 & 5
Mbyeni ...	66·2	31·2	48·7	74·0	24	21·0	4
Teyateyaneng ...	68·0	35·2	51·6	78·0	27	22·0	4
Mohalie's Hoek ...	67·9	31·8	49·8	78·0	26	18·0	4
Kuruman ...	71·7	33·1	52·4	81·0	25	24·0	4
Hope Fountain ...	71·4	43·2	57·3	86·8	31	33·5	11
Means ...	70·0	42·2	56·1	84·5	...	31·4	...
Extremes ...	...	...	...	95·0	26	12·0	4

RAINFALL, AUGUST, 1907.

I. CAPE PENINSULA:	INS.
Royal Observatory (a) 12 in. gauge	1·49
Cape Town, Fire Station ...	1·43
Do. South African College	2·12
Do. Molteno Reservoir ...	2·17
Do. Platteklip ...	2·89
Do. Signal Hill ...	1·41
Do. Hospital ...	
Sea Point, The Hall ...	1·66
Do. Attridge ...	1·71
Camp's Bay	1·14
Table Mountain Disa Head ...	1·80
Do. Kasteel Poort ...	4·01
Do. Waai Kopje ...	5·60
Do. St. Michael's ...	4·98
Devil's Peak Blockhouse ...	
Do. Nursery ...	
Do. Lower Gauge ...	
Woodstock, The Hall ...	1·72
Do. Municipal Quarry ...	2·27
Do. do. Nipher's Shield	2·60
Newlands, Montebello ...	5·25
Claremont, Carrigeen ...	
Bishopscourt	5·79
Kenilworth	4·73
Wynberg, St. Mary's ..	4·47
Groot Constantia	6·02
Tokai Plantation	3·16
Plumstead, Culmwood ...	3·26
Muizenburg (St. Res.) ...	
Fish Hoek	
Simon's Town, Wood ...	2·59
Do. Gaol ...	2·10
Cape Point	0·42
B aauwberg Strand	
Robben Island	1·02
Durbanville	0·94
Maitland Cemetery	1·61
Tamboer's Kloof	1·87
Woodhead Tunnel	3·82
Newlands Reservoir, No. 1 ...	5·34
Do. do. No. 2 ...	5·19
Lower Reservoir, Table Mountain	2·30

II. SOUTH-WEST:	INS.
Eerste River	
Klapmuts	2·20
Stellenbosch, Gaol	1·64
Somerset West	1·35
Paarl	1·75
Wellington, Gaol	1·75
Do. Huguenot Seminary	1·73
Groot Drakenstein, Weltevreden	1·92
Porterville Road	1·74
Tulbagh	1·00
Ceres Road	
Kluitjes Kraal	
Ceres	2·25
The Oaks	0·60
Rawsonville	1·20
Caledon	0·88
Worcester, Gaol	0·39
Do. Meiring	
Do Station	

II. SOUTH-WEST (con.):	INS.
Hex River	
De Doorns	
Karnmelks Rivier	0·69
Lady Grey, Division Robertson .	0·38
Robertson, Gaol	0·51
Do. Govt. Plantation ...	0·44
De Hoop	0·62
Montagu	0·79
Danger Point	0·46
Vygebooms River	1·30
Elgin Plantation	
Elsenburg Agricultural College	1·91
Berg River Hoek	
Wemmer's Hoek	
Roskeen	0·77
Vruchtbaar	2·45

III. WEST COAST:	INS.
Port Nolloth	
Do. (Lieut. Barber) ...	
Anenous	0·26
Klipfontein	0·21
Kraaifontein	0·17
O'okiep	0·35
Springbokfontein	0·05
Concordia	
Do. Kraphol	0·26
Garies	
Lilyfontein	0·85
Van Rhyn's Dorp	
Clanwilliam, Gaol	0·25
Do. Downes ...	
Dassen Island	1·47
Kersefontein	0·71
The Towers	0·95
Abbotsdale	
Malmesbury	1·15
Piquetberg	1·14
Zoutpan	0·55
Wupperthal	0·22
Welbedacht	
Hopefield, Gaol	0·47

IV. SOUTH COAST:	INS.
Cape Agulhas	0·66
Bredasdorp	0·79
Swellendam	1·38
Potberg	
Zuurbrak	1·62
Grootvaders Bosch	
Heidelberg	0·97
Riversdale	0·97
Melkhoutfontein ...	
Vogel Vlei	0·50
Geelbek's Vlei ...	
Mossel Bay	0·41
Great Brak River	0·25
George	0·91
Do. Plantation	0·76
Do. Woodifield	
Ezeljagt	
Millwood	
Sourflats	
Concordia	

IV. SOUTH COAST (con.):

Station	Ins.
Knysna	1·23
Buffel's Nek	
Plettenberg Bay	1·30
Harkerville	
Forest Hall	
Blaauwkrantz	0·72
Lottering	1·07
Storm's River	
Witte Els Bosch	1·23
Humansdorp	1·48
Cape St. Francis	1·81
Hankey	
Wittekelip, Sunnyside	
Van Staden's, Intake	1·05
Do. On Hill	0·95
Kruis River	
Uitenhage, Gaol	0·16
Do. Park	0·04
Do. Inggs	0·13
Armadale, Blue Cliff	0·09
Dunbrody	
Port Elizabeth, Harbour	0·74
Do. Victoria Park	
Do. Walmer Heights	0·96
Shark's River, Nursery	0·71
Do. Convict Station	0·80
Tankatara	
Centlivres	0·00
Edinburgh, Knysna	2·03

V. SOUTHERN KAROO:

Station	Ins.
Verkeerde Vlei	
Bok River	
Triangle	
Touws River	
Do. D.E. Office	
Pietermeintjes	
Grootfontein	
Ladismith	0·56
Amalienstein	0·36
Seven Weeks' Poort	
Calitzdorp	0·25
Oudtshoorn	1·19
Vlaakte Plaats	
Uniondale	0·00
Kleinpoort	0·10
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

Station	Ins.
Matjesfontein	
Laingsburg	
Prince Albert Road	
Fraserburg Road	0·00
Prince Albert	0·00
Zwartberg Pass	0·35
Booi's Kraal, Beaufort West	
Beaufort West, Gaol	0·05
Dunedin	
Nel's Poort	0·00
Camfers Kraal	0·00
Lower Nel's Poort	
Krom River	0·00
Baaken's Rug	
Willowmore	0·05
Rietfontein	
Steytlerville	0·32

VII. EAST-CENTRAL KAROO:

Station	Ins.
Buffels Kloof	
Aberdeen, Gaol	0·00
Do. Bedford	
Corndale	
Aberdeen Road	
Klipplaat	
Winterhoek	
Klipdrift	
Kendrew, Holmes	0·21
Do.	0·19
Graaff-Reinet, Gaol	0·00
Do. Eng. Yard	0·00
Do. College	
New Bethesda	
Roodebloem	0·00
Glen Harry	0·06
Wellwood	0·08
Do. Mountain	0·06
Bloemhof	0·10
Jansenville	0·03
Patrysfontein	
Bethesda Road	0·00
Afrikander's Kloof	
Roode Hoogte	
Toegedacht	
Klipfontein	0·00
Cranemere	
Pearston	0·00
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek	
Middlewater	0·13
Somerset East, Gaol	0·73
Do. Do. College	
Longhope	
Cookhouse	
Middleton	
Spitskop, Graaff-Reinet	0·00
Bruintjes Hoogte	

VIII. NORTHERN KAROO:

Station	Ins.
Calvinia	0·14
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	0·17
Fraserburg	0·02
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	0·00
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·00
Victoria West	0·00
Omdraais Vlei	
Doornkuilen	
Britstown	0·00
Wildebeestkooi	
Murraysburg	0·05
De Kruis, Murraysburg	0·00
Richmond	0·00
De Aar	
Middlemount	
Hanover	0·00
Theefontein	0·00

VIII. NORTHERN KAROO (*con.*):	INS.
Zwagersfontein	
Philipstown	0·00
Boschfontein	
Petrusville	
The Willows, Middelburg ...	0·00
Naauwpoort	0·00
Middelburg Gaol	0·00
Do.	
Middelburg Government Farm ...	
Jackalsfontein	0·00
Ezelpoort	0·00
Plaatberg	0·00
Grape Vale	0·00
Ezelfontein	0·00
Roodepoort	0·00
Groenkloof	0·00
Vlakfontein	0·00
Vogelsfontein	0·00
Plaatfontein	0·00
Colesberg	0·00
Tafelberg Hall	
Rietbult, Colesberg Bridge ...	
Fish River	0·00
Varkens Kop	0·00
Culmstock	
Droogefontein	
Stonehills	
Cradock Gaol	0·00
Witmoss	
Varsch Vlei	
Maraisburg	0·00
Steynsburg Gaol	0·00
Riet Vlei...	
Hillmoor...	0·00
Quagga's Kerk	
Tarkastad	0·07
Do., Dis. Engineer ...	0 00
Drummond Park	
Glen Roy	0·00
Waverley	0·08
Gannapan	
Montagu...	
Grape Vale	
Rietfontein, Cradock ...	
Schuilhoek	0·00
Vosburg	0·00
Zwavelfontein	
Holle River, Colesberg ...	
The Meadows, Schoombie ...	0·00
Cradock Station	0·00
Wolve Vlei, Middelburg ...	0·00
IX. NORTHERN BORDER:	
Pella	
The Halt	
Keimoes	
Kenhardt	0·00
Upington	0·00
Trooilapspan	0·00
Van Wyk's Vlei	0·00
Prieska	0·00
New Year's Kraal	0·00
Dunmurry	0·00
Karree Kloof	0·00
Griquatown	0·00
Campbell	
Douglas	0·00
Avoca, Herbert	
Hope Town	0·00
Orange River	

IX. NORTHERN BORDER (*con.*):	INS
Newlands, Barkly West ...	0·00
Barkly West	0·00
Bellsbank	0·00
Kimberley Gaol	0·00
Do. Stephens ...	0·00
Strydenburg	0·00
Rietfontein, Gordonia ...	0·00
Douglas, Vos	0·00
X. SOUTH EAST:	
Melrose, Div. Bedford ...	0·07
Dagga Boer	
Fairholt	0·00
Lynedoch	
Alicedale	0·00
Cheviot Fells	
Bedford, Gaol	0·12
Do. Hall	
Sydney's Hope	0·32
Cullendale	
Adelaide	0·04
Atherstone	0·24
Alexandria	0·21
Salem	0·14
Fort Fordyce	0·22
Fountain Head	
Graham's Town Gaol ...	0·19
Do. Do.	
Heatherton Towers	0·32
Sunnyside	0·21
Vischgat...	
Fort Beaufort	0·00
Katberg	0·00
Balfour	0·30
Seymour	0·00
Glencairn	
Alice	
Lovedale...	0·13
Port Alfred	0·17
Hogsback	0·63
Peddie	0·27
Exwell Park	
Keiskamma Hoek	0·38
Cathcart Gaol	0·00
Cathcart, Forman	0·00
Cathcart...	
Thaba N'doda	0·30
Evelyn Valley	0·59
Crawley	0·00
Thomas River	0·00
Perie Forest	0·50
Forestbourne	0·43
Isidenge	0·45
Kologha	0·18
King William's Town Gaol ...	0·24
Do. Do., Dr. Egan	
Stutterheim, Wylde... ...	
Do., Besté	0·14
Fort Cunynghame	0·11
Dohne	
Kubusie	
Quacu	0·10
Blaney	0·00
Kei Road	0·08
Berlin	
Bolo	
Fort Jackson	0·00
Prospect Farm, Komgha ...	
Komgha Gaol	0·13
Chiselhurst	

X. SOUTH EAST (*con.*):

	INS.
East London West	0·15
East London East	...
Cata	0·43
Wolf Ridge	0·40
Dontsah	0·25
Mount Coke	0·00
Blackwoods	0·31
Albert Vale, near Bedford	0·13
Heatherton (Irrigation)	0·15
Huxley Farm, Stutterheim	0·08

XI. NORTH-EAST:

	INS.
Venterstad	0·00
Mooifontein	0·00
Burnley, Cyphergat	...
Burghersdorp Gaol	0·00
Ellesmere	...
Molteno	0·01
Lyndene	0·00
Cyphergat	...
Thibet Park	0·00
Sterkstroom Station	0·00
Do. Gaol	0·00
Rocklands	0·00
Aliwal North Gaol	0·00
Do. Brown	0·00
Do. Dist. Engineer	0·00
Buffelsfontein	0·00
Hex's Plantation	...
Poplar Grove	...
Carnarvon Farm	0·02
Halseton	0·00
Jamestown	0·00
Whittlesea	0·00
Queenstown Gaol	0·00
Do. Beswick	0·00
Rietfontein, Aliwal North	...
Middlecourt	...
Dordrecht	0·00
Tylden	0·00
Nooitgedacht	...
Herschel	0·01
Lady Grey	0·00
Lauriston	0·00
Lady Frere	...
Contest, near Bolotwa	...
Sterkspruit	...
Doornkop	...
Avoca, Barkly East	...
Keilands	0·04
Palmietfontein	...
Barkly East	0·03
Blikana	0·02
Glenlyon	...
Rhodes	...
Gateshead	...
Cliftonvale	...
Albert Junction	0·00
Queenstown, District Engineer's Office	0·01
Hughenden	0·00
Glenwallace	0·01
Indwe, District Engineer's Office	0·00
Bensonvale Inst., Herschel	...
Cathcart Station	0·00
Royal, Div. Albert	...
Lady Grey Station	0·00
Dordrecht, D.E.'s Office	0·00
Stormberg Junction, D.E.	0·00
Broughton, Molteno	0·00

XII. KAFFRARIA:

	INS.
Ida, Xalanga	0·02
Slaate, Xalanga	0·01
Cofimvaba	...
Tsomo	0·18
N'qamakwe	0·12
Main	0·13
Engcobo	0·04
Butterworth	0·11
Woodcliff	0·00
Kentani	0·05
Maclear	0·05
Idutywa	0·00
Bazeya	0·06
Willowvale	0·01
Mount Fletcher	0·00
Somerville, Tsolo	0·02
Elliotdale	0·08
M'quanduli	...
Matatiele	...
Umtata	0·04
Cwebe	0·10
Tabankulu	0·00
Mount Ayliff	...
Kokstad	0·00
Do., The Willows	0·01
Seteba	0·00
Flagstaff	0·00
Insikeni	0·00
Port St. John's	0·02
Kilrush, Sneezewood	...
Umzimkulu	0·00
Mandileni	...
Wanstead	...
Cedarville	...
Maclear Station	0·03

XIII. BASUTOLAND:

	INS.
Mafeteng	0·00
Mohalies Hoek	0.00
Maseru	0·00
Teyateyaneng, Berea	0·00
Moyeni Quthing	0·02
Qacha's Nek	0·00
Leribe	...
Butha Buthe	...

XIV. ORANGE RIVER COLONY:

	INS.
Bloemfontein	...

XV. NATAL:

	INS.
Durban, Observatory	0·01

XVI. TRANSVAAL:

	INS.
Johannesburg	...

XVII. BECHUANALAND:

	INS.
Taungs	0·00
Vryburg	0·00
Mafeking	...
Setlagoli	0·00
Kuruman	0·00
Zwartlaagte	...

XVIII. RHODESIA:

	INS.
Hopefountain	0·00
Rhodes Matopo Park	0·00

XIX. DAMARALAND:

	INS.
Walfish Bay	...

DEPARTMENTAL NOTICES.

The Treatment of Locusts with Arsenic, with comments on other means of control.

The following account of means for destroying locusts is extracted from a report (manuscript) submitted July 7th, 1907, to the Governments of the various British possessions in South Africa by the Committee of Control of the South African Central Locust Bureau.

1. Arsenical Solutions.

It seems desirable that some account of the use of arsenic as an agent for destroying locusts should be given in this report. Throughout South Africa, wherever it has been tried, it has proved itself more generally adaptable to all conditions than any other means..................

The use of arsenic was first adopted by Mr. Gilbert Wilkinson, a Natal Sugar Planter, in 1894.................

As indicated elsewhere in this report, the official recognition of this means of destroying young locusts and its adoption was entirely due to the efforts of the present Entomologist of Natal and outside of Natal to the success attending the introduction of the method into the Transvaal by the late C. B. Simpson. From every available source the information gathered together shows its superiority over mechanical devices. Evidence of this nature is forthcoming from practical farmers, planters, and agriculturists throughout Natal, Transvaal, Orange River Colony, and the Eastern province of the Cape Colony. Further, as regards the danger attendant upon the use of so highly poisonous a chemical as arsenic to man and to stock, in view of the vast amounts which have been used last season alone, roughly 50 tons, without a single misadventure, is in itself sufficient favourable evidence, more particularly as to the very large extent this has been ultimately distributed on the veld by natives.. ... .

It may be added............. .... .that the attendant risk of damage to stock is found to be very small, and in the very few instances where such have occurred in the past it has been traced definitely to almost foolish negligence. If the solution is prepared and applied as recommended it is very difficult for a beast or a horse to absorb a noxious dose. Furthermore, fowls, pigs and horses have gorged themselves on the poisoned insects without ill-effects.

In making reference to the general adaptability of destroying locusts by means of the arsenical solution to all conditions, this statement is based upon the successful use of it over such widely different topographical conditions as those presented by the abrupt and hilly nature of the Colony of Natal and the plains of the Transvaal and Orange River Colony..................

In preparing the poison, white arsenic, soda, and treacle as a sweetening agent, were originally used by the planters of Natal. In the course of the Government's operations it was found impracticable to transport treacle advantageously over long distances, and treacle sugar and mill sweepings were adopted. Subsequently, on the suggestion of Mr. C. P. Lounsbury, the Cape Entomologist, a trial was made with arsenite of soda in Natal, and this proved of so great an advantage, economically, over the arsenic and soda solution that it is now adopted by all the Governments.

There still exists among some planters in Natal a prejudice in favour of the arsenic and soda solution, but officials who have worked with both for a number of years are unhesitatingly in favour of the arsenite of soda.

In view of the more general adoption of poisoning than even now exists, it is considered advisable that recognised formulae for the preparation and the use thereof should be agreed upon. The Committee, therefore, suggests the following :—

The preparation and use of the sweetened Arsenical Solution for the destruction of wingless Locusts.

1. White Arsenic Solution.

Formula.

White Arsenic (Arsenious Oxide)	1 pound.
Soda (Caustic or Washing)	8 ounces.
Sugar or Treacle	2—4 pounds.
Water	17 gallons.

Boil the arsenic and soda together with 2—3 gallons of water in a 4-gallon tin or pot until the arsenic is quite dissolved. While this is being done dissolve the sugar in another vessel. Mix together with the balance of the water and the solution is ready.

2. Arsenite of Soda or Sodium Arsenite Solution.

Formula.

Arsenite of Soda	1 pound.
Sugar or Treacle	2—4 pounds.
Water	16 gallons.

Mix the arsenite of soda and sugar (or treacle) in sufficient cold water to thoroughly dissolve them, when this is accomplished add the balance of water and the solution is ready for use. The arsenite of soda will dissolve more readily in hot water than cold, but it is only necessary to do this when the saving of time is the main object in view. In preparing large quantities of solution it is best to place the arsenite of soda in water and allow it to remain there overnight, about one gallon of water should be allowed for each pound weight of the arsenite. By suspending the poison tied in a sack, in the water, the dissolving thereof is facilitated.

3. Use of the Solution.

(*a*) Whichever solution is adopted should be sprayed on the grass, bushes, etc., which the locusts are eating, or just about to eat. When they are small it may be sprayed among them or in a circle around them; but, when large and on the move, a strip of grass along their front should be sprayed.

(*b*) The solution is best applied with a spray pump, and for the purpose the "Deming's Success" Bucket Pump, fitted with a "Bordeaux" nozzle, has been found the most suitable. These spray pumps require a certain amount of care in handling, and it is well to practise with water before using the solution. The nozzle must be adjusted to throw a fine mist to fall lightly on the grass without drenching it. The nozzle of the pump should not be turned off whilst pumping is going on or whilst there is pressure from the air-chamber. If this is done, not only is the hose loosened but it may very often burst or be otherwise damaged by the great pressure of the liquid contained in it.

(*c*) A good time to spray is when the locusts are camping for the night or otherwise in the very early morning before they spread out and become active in the heat of the sun.

4. Various Strengths of Solution.

(*a*) In preparing the solution an ordinary paraffin tin may be used as a 4-gallon measure for the water, the ordinary 4 lb. golden syrup tin makes a convenient measure for treacle and a bully-beef tin or a large cup will hold 1 lb. of arsenite of soda. Large quantities, however, should be weighed where the weight contained in the package is unknown.

(*b*) Whilst the locusts are young, *i.e.*, in the first two weeks of their growth, the solution should be prepared as follows :—

Arsenite of Soda...	1 lb. (1 beef tin or large cup full).
Sugar	2 to 4 lbs (2 or 4 beef tins or 2 or 4 large cups full).
Or Treacle	2 to 4 lbs. (1 syrup tin full).
Water	16 gallons (4 paraffin tins full).

(c) When the locusts are half-grown, *i.e.*, from 2 to 5 weeks old, the solution should be strengthened to :—

Arsenite of Soda...	1 lb.
Sugar	2 to 4 lbs.
Or Treacle	2 to 4 lbs.
Water	12 gallons (3 paraffin tins full).

(*d*) For large hoppers with wing-pads well defined, from 5 to 8 weeks old, use :—

Arsenite of Soda.	1 lb.
Sugar	2 to 4 lbs.
Or Treacle	2 to 4 lbs.
Water	8 gallons (2 paraffin tins full).

(*e*) A solution stronger than one pound of arsenite of soda to eight gallons of water should on no account be used.

(*f*) Locusts when poisoned may take up to four days to die off.

(*g*) Packages containing arsenic or arsenite of soda should be marked "Poison," and kept under lock and key.

(*h*) Analysis has shown that 36 lbs. of grass, sprayed with the strongest solution recommended will, if eaten, contain sufficient arsenic to kill a young calf; and 72 lbs. an ox. Therefor all animals should be kept away from the sprayed areas until the arsenic has burned the grass and caused it to die, or until a heavy rain has washed it off.

(*i*) As the solution has a caustic effect and not unusually induces sores upon the bare legs of natives when spraying, they should be provided with trousers or leggings of sacking or otherwise with grease to rub the limbs before commencing the day's work.

(*j*) Care must, of course, be taken to prevent animals drinking from vessels containing the solution.

(*k*) If these precautions are carried out no accidents need occur.

Soap.

Soap solutions are very efficient for destroying the very young locusts, and may often be used to great advantage, particularly in gardens and small cultivations. When the hoppers are half-grown or larger the solution is found ineffective, chiefly owing to the difficulty of reaching and covering each individual. Almost any kind of soap will answer for this purpose, but from such tests as have been conducted Gossage's National blue mottled at the rate of 1 lb. to 5 gallons of water has proved the most effective and cheapest. Ordinary solutions should be made at the rate of 1 lb. of soap *to from 3 to 5 gallons of water and be applied by means of a spray pump. The effect* of soap solution is to kill by clogging the breathing pores of the insects. The principal drawback to the use of soap exclusively, apart from the fact that it can only be economically employed against very young locusts is the difficulty experienced in dissolving large quantities.

Oil.

Paraffin oil is an effective agent when sprayed over young locusts, and acts as a contact insecticide. Economically, it does not compare with either the arsenical or soap solutions, being far too expensive. Further it is injurious to vegetation. Paraffin emulsion does not appear to possess the efficiency of either of the materials of which it is composed, *i.e.*, soap solution and paraffin oil.

Dips.

Quite a number of the various proprietary dips for stock upon the market have been called into use in one way and another in the destruction of locusts with more or less success. Their cost upon the whole renders their extensive use impossible......

The value of the dips at present obtainable is in accordance with the amount of arsenic contained therein. With regard to certain of these it may be said that :—

1. "Quibell's Cattle Paste" at 1 to 9 of water (volume) is efficient for destroying quite young locusts, but useless against large hoppers.
2. "R.D. Dip" at from 1 to 5 bottles (according to the size of the locusts) to 4 gallons of water, sweetened, was found very effective, and was used quite extensively by the Transvaal during the past season when the supplies of arsenite of soda and arsenic were exhausted. The value of the dip is entirely in its arsenic component, but it cannot be recommended in preference to arsenite of soda on account of the cost.

3. Mally's Cape trials showed that Laidlaw's tobacco dip was useless, Little's Dip at 1 to 10 unsatisfactory, whilst Lawe's Dip at the same strength did almost perfect work.

Cooper's Dip as a substitute for arsenic is valuable, but the cost is prohibitive.

MECHANICAL CONTRIVANCES.

Mechanical contrivances from artillery, bombs, and exploding balloons to rollers, hopper dozers, screens and traps, all engage one's attention under this heading. There is, however, little profit in discussing them here. Of the first series all are impracticable, and the second have proved but minor expedients in dealing extensively with the plague; or, to quote Mr. Baynes' address, their use might be likened to an attempt at emptying the Indian Ocean with a teaspoon.

Amongst the more recent developments in the way of mechanical contrivances mention should be made of Mally's trapping system of which an account is to be found in the Cape *Agricultural Journal* March, 1905. This is particularly serviceable where it is desired to collect quantities of locusts for drying... ... ...

A resident... . . ..of Port St. John's has also patented and is improving a device which under given conditions may yet prove among the best of mechanical contrivances for killing locusts. In a few words, it is a blast lamp suitably adapted for killing hoppers and fliers at rest by scorching. In a dry veld, grave danger of starting a grass fire would be an attendant risk in the use of these pumps, but as locusts are generally troublesome when the veld is green the machine may prove serviceable, and, if it does what its inventor claims for it, economical as well. It is hoped to test this machine quite thoroughly next locust season.

BURNING.

It is quite practicable to destroy hoppers by firing the grass they are in, provided, of course, it is dry enough. This method is now becoming more generally adopted by the Zulus, many of whom are particular to leave a certain amount of old grass about their cultivations so that they can more readily destroy hoppers by firing the grass in the summer.

DEPARTMENTAL PUBLICATIONS.

The following pamphlets, reprints, etc., are obtainable on application to the Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town. Members of Farmers' and Fruit Growers' Associations applying for same through the Secretaries of these Associations are supplied free of charge.

Agricultural Miscellanea, price 6d. each. Extracts from Vol. I. to V. of *Agricultural Journal.*

Artificial Grasses and Fodder for Stock; Ensilage; Treatment of Cereal and other Crops; Viticulture and Wine Making; Forestry; Locusts and their Destruction; Possible New Industries for Cape Farmers; Dairying; Fruit Culture (6d.).

Agriculture.

Wheat Production in Australia (1s. 6d.) by A. C. Macdonald; *Wheat Production in Australia (1s. 6d.) by W. Halse and J. D. J. Visser ; Hop Cultivation (3d.) translated by A. W. Heywood; *Brak Land in Relation to Irrigation and Drainage (1d.); The Velvet Bean (1d.); Potato Disease (1d.); Scheme of Manurial Experiments (1d.); Leguminous Forage Crops for Trial in Cape Colony (1d.); Sundry Forage Crops for trial in Cape Colony (1d.); Poultry in South Africa: Rearing, Management and Improvement, with notes on Prevalent Diseases and Internal and External Parasites (3d.); The Salt Bushes (1d.); Tobacco Culture by P. Bornemisza (1d.); The Cultivation of Tobacco in the Colony by K. Schenck (3d.); Tobacco Wilt in Kat River Valley (1d.); *The Process and Appliances for the Flue Curing of Tobacco (3d.).

Dairying.

Dairy Breeds by A. C. Macdonald (9d.); *Dairy Industry in Great Britain by A. C. Macdonald (6d.); *Dairy Industry in Denmark (2d.); Ready Reckoner for Cream Testing (1s.); †Dairy and its Products by D. Hutcheon (2d.); *Cheddar Cheese Making (1d.).

Entomology.

The Bont Tick (1d.); Bean Bruchus (1d.); Cabbage Aphis (1d.); Codling Moth in Madeira Fruit (1d.); *Codling Moth (1d.); Fruit Fly (1d.); Fumigation Supplies (1d.); Insect Friends and Foes (1d.); Methods of Locust Destruction (1d.); *Peach Yellows (1d.); Pear Slug, Paris Green (1d.); Remedy for Mestwurmen (1d.); *Spray Calendar (1d.); *Spray Pump Notes (1d.); Scale Insects on Ornamental Trees and Plants (1d.); Two Pine Apple Pests (1d.); Tree Fumigation in California (1d.); Winter Spraying (1d.); Wattle Bag Worm (1d.); Bordeaux Mixture (1d.); Death Head Moth Superstition (1d.); Fumigation under Box Covers (1d.); The House Fly (1d.); New Oak Tree Pest (1d.); Nursery Inspection and Quarantine Bill (1d.); Potato Tuber Moth (1d.); The Codling Moth: Notes on its Life Cycle and Remedies (1d.); Gall Worms in the Roots of Plants (1d.); *The Fruit Fly (with coloured plates), (3d.); Another Introduced Scale Pest (1d.); Washes for Red Scale (1d.); Fruit Fly: Peach Fly Moth (1d.); Lime Salt Wash for Scale Insect (1d.); The Fruit Moth (1d.); Fusicladium of the Apple and Pear (1d.); Mealie Stalk Borer (3d.)—*coloured plate*; Cleaning up Nursery (1d.); Natural Enemies of the Fruit Fly: Report on Investigations in Brazil (1d.); Locust Birds and Locust Poison (1d.); The Brazil Fruit Fly Parasites (1d.); Cyanide Gas Remedy for Scale Insects (3d.); Arsenate of Lead (1d.); The Antestia Fruit Bug (1d.); Caterpillars Destroying Trees (1d.).

Note.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

Forestry.

British National Forestry (1d.); Botanical Observations on Forests in Eas Pondoland (1d.); †Elementary Principles of Sylviculture or Woodcraft (1 National Forests (1d.); Indigenous Timbers of the Cape (1d.); Misuse of and the Uses of Forests (1d.); Tree Planting for Timber and Fuel (1d.); Planting for Farmers (1d.).

Fisheries.

Trout and Carp Breeding and Stocking of Streams (1d.); *Methods of Preser Fish by Smoking (1d.); Portable Floating Hatching Box for Trout Ova (1d The Protection of Trout (1d.); The Ocean and its Resources (1d.).

Horticulture.

Fruit Culture in the Gamtoos River Valley (1d.); *Marketing of Fruit (1d.); The Olive at the Cape (2d.); Tomatoes and Fruit for Export (1d.); Citrus Culture in Cape Colony: Report of the Citrus Commission (1d.); *Fruit from Orchard to Buyer (1d.); Netting for Fruit Trees (1d.); Fruit Culture in Argentina (1d.); Vegetables for Exhibition (1d.); Chrysanthemum Rust (1d.).

Veterinary and Animal Industry.

*Anthrax, Charbon, Mitzbrand or Miltziekte (1d.); *Heartwater (1d.); *Malarial Catarrhal Fever of Sheep (1d.); Rinderpest: Dr. Koch's Report (1d.); *Inoculation against Rinderpest (1d.); Dr. Kohlstock's Report on Inoculation for Rinderpest (1d.); *Redwater, Texas Fever or Tick Disease (1d.); *Redwater, Anthrax and Quarter Evil (1d.); *Sheep and Wool (1d.); The Eye and its Diseases (1d.); Husk, Hoose or Parasitic Disease of the Lungs of Cattle, Sheep and Pigs (1d.); Tick Heartwater Experiments (1d.); Indigestion and Diarrhœa in Calves (1d.); Persian Sheep and Heartwater (1d.); Poisoning of Stock (1d.); Retention of the Fœtal Membrane, or Afterbirth in Cows (1d.); Stijfziekte, Lamziekte or Osteo-Malacia and Paralysis (1d.); Tuberculosis and the Use of Tuberculin (1d.); African Coast Fever, with Description of Dipping Tank (3d.); *Rinderpest in South Africa (3d.) by D. Hutcheon; *Fluke or Slak in Liver of Sheep (3d.)—*coloured plate*; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte (1d.); Osteo Porosis (3d.)—*coloured plates*; *Glanders (3d.)—*coloured plate*; *Animal Castration (1d.); *Preventive Inoculation for Redwater (1d.); *Abortion in Cattle (1d.); Treatment for Worms in Domestic Animals (1d.); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia or Pleuro-Pneumonia-Bovum-Contagiosa (1d.); *Swine Fever, Hog Cholera or Pig Typhoid (3d.)—*coloured plates*; Castration of Females and Animals other than the Horse (1d.); Poisoning of Horses by *Ornithogalum Thrysoides* or Chinkerinchee (*coloured plate*) (3d.); Horse Sickness by D. Hutcheon (2d.); Ticks and African Coast Fever (1d.); Cirrhosis of the Liver in Stock (1d.); Liver Disease among Calves (3d.); The Arsenite of Soda Dipping Mixture (1d.); *Lampas; Preventive Vaccination against Anthrax.

Viticulture.

†Reports on Viticulture (3d.); *Reconstitution of Phylloxerised Vineyards (1s.); Report on Failure of Hanepoot Grapes on American Vines (1d.); The Making of Wine and its By-Products (6d.); How to Treat Wine Casks (1d.); Failure of Vines (1d.); Manufacture of Dry Wines in Hot Countries (3d.); Anthracnose in Constantia (1d.).

Miscellaneous.

Game Seasons (3d.); Land Laws of Cape Colony (1d.); †Monsonia: the Cape Cur for Dysentery (1d.); *Rainfall in South Africa (1d.); Sand Dunes of Gasco (5d.); The Metric System (1d.); South African Stud Book Constituti Rules, etc. (1d.); Bars in Ostrich Feathers (1d.); *Information regarding Mining Laws (1s.); The Preservation of Game in Cape Colony.

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 28th September, 1907, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat	B. Wheat Flour	C. Boer Meal	D. Mealies	E. Mealie Meal	F. Barley	G. Oats	H. Oat-hay	J. Potatoes	K. Tobacco (Boer Roll)	L. Beef	M. Mutton	N. Fresh Butter	O. Eggs	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per 100 lbs.	per lb.	per lb.	per lb.	per lb.	per doz.		
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	s d	s d	£ s d	s d		
Aliwal North ..	0 10 0	0 18 6	0 11 9	0 4 3	0 12 0	0 6 0	0 6 0	0 7 6	0 5 0	1/6 to 2/-	6d. to 8d.	6d. to 8d.	1/9 to 2/-	0 0 9	£9 to £10	15/- to 19/-
Beaufort West ..	0 10 0	0 16 0	0 14 0	0 6 6	0 10 0	0 8 0	0 7 9	0 5 6	0 8 0	0 0 6	*4½d.	*5d.	0 1 3	0 1 0	£16	20/-
Burgersdorp ..	0 9 0	15/6(bag)	24/-(bag)	0 4 6	13/-(bag)	8/-(bag)	0 18 6	0 7 0	0 3 0	0 0 6	0 0 8	0 0 6	0 1 9	0 0 9	..	..
Cape Town ..	..	..	..	..	..	0 7 6	0 6 0	0 4 0	0 8 0	..	..	..	0 1 3	0 0 11	..	..
Clanwilliam ..	0 12 0	..	0 13 0	0 8 0	..	..	0 9 6	..	..	0 1 0	7d. to 8d.	0 0 7	0 1 6	9d. to 1/-	..	20/-
Colesberg	..	..	..	9/6 to 10/- per bag.	..	..	9/3 to 11/- per bag.	..	..	..	..	0 0 4	1/8 to 2/-	10d. to 1/-	..	..
Cradock	..	..	0 12 6	0 5 0	..	..	0 7 6	0 8 0	0 7 0	0 0 4	..	0 0 5	0 2 3	0 1 3	£9	16/-
Dordrecht.. ..	0 7 0	0 14 6	0 10 0	0 4 0	0 7 0	0 4 0	0 5 0	0 3 0	0 3 0	0 0 9	0 0 6	0 0 7	0 2 0	0 1 0	£9	16/-
East London ..	0 7 0	0 11 3	0 9 0	0 5 0	0 8 3	0 5 0	0 5 3	0 5 6	0 8 9	0 1 6	*8d. to †7d.	*8d. to †7d.	0 2 4	0 1 1	£21	37/-
Graaff-Reinet ..	0 9 0	..	..	0 6 0	..	..	..	0 6 0	0 6 6	..	0 0 5	0 0 5	0 1 9	0 0 9	£11	20/-
Graham's Town ..	0 7 3	0 6 2	..	..	..	0 4 10	0 7 6	0 8 9	0 8 9	0 0 7½	0 0 6	0 0 6½	0 2 1½	0 1 1½	..	..
Kimberley ..	0 10 0	0 15 0	0 13 6	0 5 0	0 6 6	0 7 6	0 7 6	0 6 6	12/- local 7/6 other	0 0 7	0 0 10	0 0 8	0 1 6	0 0 11	£10 to £15	16/- to 20/-
King Wm.'s Town..	0 8 9	0 15 3	0 13 6	0 5 3	0 5 6	0 4 6	0 5 0	0 5 3	0 6 0	0 0 6	0 0 6	0 0 6	0 2 3	0 1 0	£14	25/-
Malmesbury ..	0 10 0	0 14 0	0 12 0	0 7 6	..	0 7 0	0 5 0	0 4 0	0 9 0	0 0 10	0 0 6	0 0 6	0 1 1	0 0 9	£13	£1
Mossel Bay ..	0 11 0	0 14 6	..	..	..	..	..	..	0 16 0	..	..	0 0 8	..	..	..	..
Port Alfred ..	0 8 6	0 15 0	0 14 0	0 6 0	0 10 0	0 5 0	0 6 0	0 5 0	0 10 0	0 0 6	0 0 6	0 0 6	0 2 0	0 0 6	..	..
Port Elizabeth ..	0 8 0	..	..	0 6 0	..	0 4 6	0 7 6	0 7 6	0 10 6	..	0 0 7	0 0 7	0 2 0	0 1 0	..	..
Queen's Town ..	0 8 6	0 16 0	0 13 0	0 4 6	0 7 6	0 4 6	0 7 6	0 5 3	0 4 6	0 1 0	0 0 7	0 0 6	0 2 6	0 0 9	£12 to £14	18/- to 22/6
Tarkastad.. ..	0 12 0	0 12 6	0 11 6	0 7 6	0 10 0	0 6 6	0 10 0	0 5 9	0 3 6	0 1 0	*0 0 5	*0 0 5	0 2 0	0 0 9	£10	20/-
Vryburg	0 12 0	0 17 6	0 15 0	0 6 0	0 8 0	0 7 6	0 8 0	0 8 9	0 13 0	0 0 7½	0 0 6	0 0 6	0 1 6	0 0 9	£10 to £12	15/- to 17/6
Worcester	0 10 6	0 14 0	0 11 0	0 7 0	0 8 0	0 7 0	0 7 0	0 5 0	0 7 0	0 0 6	*6d. to 9d. †5½d. to 9d.	*5½d. to 6d. †5½d. to 6d.	0 1 3	0 0 9	£9 to £13	21/6 to 24/6

NOTE.—A blank space denotes "no transactions. * Colonial. † Frozen.

THE PRODUCE MARKET.

CAPE TOWN.

Mr. R. Müller, of Strand Street, reports for the month ending September 30th :—

Ostrich Feathers.—There has been a good turnover during the past month. All superior quality meets with a good demand at unchanged rates. Blacks and Drabs are firm at old rates, but common quality of Wings and Shorts remain neglected.

	£	s.	d.	£	s.	d.
Super Primes	17	10	0	35	0	0
Firsts, ordinary to Super	11	0	0	14	10	0
Seconds	8	0	0	9	10	0
Thirds	6	0	0	7	10	0
Femina Super	12	0	0	16	0	0
Femina, Seconds to Firsts	5	10	0	10	10	0
Byocks (fancy)	5	10	0	9	10	0
Long Blacks . ..	3	10	0	7	10	0
Medium Blacks... . .	2	10	0	3	10	0
Short to Medium ...	0	10	0	2	10	0

	£	s.	d.	£	s.	d.
Floss	0	5	0	1	15	0
Long Drabs	2	10	0	4	0	0
Medium Drabs	1	0	0	2	0	0
Short to Medium ...	0	10	0	1	0	0
Floss	0	2	6	1	15	0
White Tails	2	0	0	3	10	0
Coloured Tails	0	10	0	2	10	0
Chicks	0	1	0	0	2	0
Spadonas	2	10	0	5	0	0
Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—Supplies are coming forward more rapidly now, many good clips from the Calvinia, Roggeveld and Malmesbury districts have been disposed of during the past month. Prices have been very firm, and an upward tendency has been the dominant factor at our local sales. At the London Colonial Wool Sales, which opened on the 24th of last month, there was a strong competition. Ordinary Snow Whites, Scoureds and Medium Greases were ½d. dearer; Combing Greases ½d. to 1d. dearer; while Super Snow Whites were 1d. dearer. On our local market best light Malmesbury's realised up to 9¾d.; Long Karoo superior and light, up to 9¾d.; Superior Light Roggeveld up to 10¼d.; Calvinias from 7d. to 8½d.; best Coarse and Coloured up to 4½d.; Inferior from 1½d. to 3d.; Extra Super Snow Whites may be quoted up to 1s. 11d.

	s.	d.	s.	d.
Super long Grass Veld	0	8	0	10½
Do. Karoo	0	7	0	9½
Medium	0	5½	0	6½
Short and Inferior	0	4	0	5
Wool for washing	0	4½	0	7

	s.	d.	s.	d.
Snow-white, Super to Extra	1	7	1	10½
Do. Ordinary	1	1	1	6
Fleece, washed...	0	0	0	11

Mohair.—There is little change to report. Sellers are holding for higher prices, and business has therefore been rather restricted. 13½d. may be quoted for good Summer Firsts and for Superior Clips probably 14d. could be obtained; White Kids may be quoted at 18d. Winter Hair has been sold at 11d., and Winter Kids at 14d. Though enquiry is somewhat limited, trade may be said to be in a healthy condition.

	s.	d.	s.	d.
Firsts, Summer	1	1½	1	2
Kids	1	3	1	6
Seconds	0	6½	0	10

	s.	d.	s.	d.
Winter	0	10½	0	11
Do. Kids	1	1	1	2

Hides and Skins.—At the London Sheepskin Sales, held on the 27th of last month, Long Wool Skins showed a farthing advance; Shorn a farthing decline, and Damaged and Lambs, from a farthing to halfpenny decline. Other sorts unchanged.

PORT ELIZABETH.

Messrs. J. Daverin & Co. report under date September 27th:—

Ostrich Feathers.—The market was well supplied this week with a fair average assortment. Competition was active, and full prices were paid for all descriptions. Amongst the large and valuable consignments sold was a fine plucking from the well-known camps of Mr. H. A. Holmes, of Kendrew, which realised extreme prices. The plucking weighed 165 lbs., and realised £980, or an average of close on £6 per lb. all round. The total quantity sold on the market realised £13,869 9s. 4d., and weighed 5,485 lbs. 13 ozs. Only a limited amount of business was done out of hand, at current prices. The next London sales open on Monday, the 7th prox., when a large quantity will be offered. The results are anxiously awaited by both buyers and sellers.

	£	s.	d.	£	s.	d.
Primes: Extra super				Special Prices.		
Good to super	15	0	0	20	0	0
Whites: Firsts ...	11	0	0	15	0	0
Seconds	7	0	0	10	0	0
Thirds	2	10	0	6	0	0
Feminas:						
Super	11	0	0	16	0	0
Firsts	8	0	0	10	0	0
Seconds	4	10	0	6	10	0
Thirds	2	0	0	3	0	0
Greys	4	10	0	8	0	0
Fancy	5	10	0	9	0	0
Tails: White ...	1	10	0	3	15	0
Light	1	5	0	3	0	0
Coloured & Dark	0	5	0	1	2	6
Blacks: Long .	3	10	0	5	10	0
Medium	1	5	0	2	10	0
Short	0	10	0	1	0	0
Wirey	0	1	0	0	1	0
Floss	0	6	0	1	5	0
Drabs: Long ...	1	10	0	4	0	0
Medium .. .	0	12	6	1	0	0
Short	0	2	6	0	6	0
Wirey	0	0	6	0	1	0
Floss	0	6	0	1	5	0
Spadonas: Light	1	15	0	5	0	0
Dark	0	10	0	2	10	0
Chicks	0	0	3	0	2	6

Wool.—The London Sales opened on Tuesday with a firm tone, and since then we have received further cable news reporting an advance of ½d. on Snow-whites and ¼d. on Grease. Our local market continues very firm, and all well-conditioned parcels now arriving meet with a ready sale at extreme prices. Extra well-grown clips of good quality and condition fetch fancy prices. On yesterday's public market a fair quantity was offered. Prices for Merinos showed no change, but coarse and coloured wool, of which there was a fair quantity offered, was quite neglected, and several lots were withdrawn at 3d. to 3½d. per lb. We would recommend caution in buying very kempy lots, as there is little doubt but that prices will come even lower for this description. Really good lots are wanted at full prices.

Snowwhite, Extra Superior ...	20d	to	21½d
Do. Superior	18d	„	20d
Do. Good to Superior...	16½d	„	17½d
Do. Inferior Faulty ...	16d	„	16½d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	10d	„	10½d
Do. do. do. ...	8½d	„	9½d
Do. do. Karoo grown (special clips)	8½d	„	9½d
Do. do. do. ...	7½d	„	8d
Do. do. Mixed Veldt...	7½d	„	8d
Do. Light, faultless, medium Grassveldt grown ...	7d	„	8d
Do. do. Karoo grown	6½d	„	7d
Do. do. short, do.	6d	„	6¼d
Grease, Coarse and Coloured ...	4d	to	4½d
Scoured do. do. ...	6½d	„	12d
Basuto Grease, short	7d	„	7½d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	8d	„	9d
Do. do. do. ...	7d	„	7¾d
Do. do. medium grown, light, with little fault	6½d	„	7d
Do. do. short, faulty & wasty	5½d	„	6d
Do. do. Karoo grown, long & well-conditioned ...	6¾d	„	7½d
Do. do. medium grown, light with little fault ...	5½d	„	6½d
Do. do. short, faulty and wasty...	5d	„	5½d

Mohair.—There is still no enquiry for Summer Firsts, the stock of which remains at about 5,000 bales. A good demand continues for both Winter and Winter Kids, at 11d., and 13½d. to 14d. For some special clips grown by Messrs. J. Hobson & Son, of Harefield, Jansenville; L. A. D. Basson, of Rietfontein, Aberdeen; and W. J. Edwards, Graaff-Reinet, 14½d. was obtained. The prospects for these descriptions appear favourable. On the public market on Tuesday a large quantity was offered to a dull market, with the result that a considerable proportion had to be withdrawn.

Super Kids	17½d to 18½d	Mixed O.R.C. Hair (average)	11d to 11½d
Ordinary Kids and Stained ...	16d „ 17d	Do. very mixed ...	10d „ 10½d
Superior Firsts, special clips (nominal)	14d „ 14d	Seconds and Grey	9d „ 10½d
Ordinary Firsts...	13d „ 13½d	Thirds	5½d „ 5¾d
Short Firsts and Stained ...	12½d „ 12½d	Winter Kids, special clips ...	13½d .. 14d
Superfine Long Blue O.R.C. Hair	13½d „ 13¾d	Do. good ordinary ...	12½d „ 13d
		Winter Hair	10½d „ 11d
		Basuto Hair	11½d .. 12d

Hides.—Sundried sold at 8¼d., damaged, 6d. per lb.; Drysalted, 7¼d., damaged, damaged, 7d. each; Goat, 11d.; damaged, 6d. per lb.; Angoras, 9d.; Shorn, 7d.; damaged, 4½d. per lb.; Springbok, 8d.

Hides.—Sundried sold at 8¼d., damaged, 6d. per lb; Drysalted, 7¼d., damaged, 5½d. per lb.; Madagascar hides, 6¼d., damaged, 5d. per lb.; Thirds, 3½d. per lb.

APPLICATIONS FOR AGRICULTURAL EMPLOYMENT.

R. Thomson; May Cottage, Newlands Avenue, Cape; Lad aged 18; Strong: Two years' experience in Mechanics: Wishes to learn Mixed Farming on Farm within 50 or 60 miles of Cape Town.

N. A. Blanckenberg; Roodekleigat, P.O., Malmesbury (two hours from Malmesbury), has Vacancies for Two Young Men to learn Stock and Grain Farming; must be healthy, quiet and of respectable parents and should be members of the Reformed Church Parents are welcome to visit the Farm.

Farm Manager wants re-engagement. Stock Farm preferred. References given Reply "Manager." c/o Mrs. C. L. Allnutt, 5, Barkley Terrace, Cape Town

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for **2s. 6d.**, (minimum charge) per insertion, and **6d.** per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY 125-127, Long Street, Cape Town, to whom all communications should be addressed.

CATTLE.

Thoroughbred pedigree **JERSEY BULLS** for sale, from Imported or Colonial bred prize stock, good milking strain. For particulars, apply to SUPERINTENDENT, Porter Reformatory, Tokai. P O., Retreat.

SHEEP.

R. Pell Edmonds, RIPPLEMEAD, DOHNE, Breeder of Pure-bred **PEDIGREE MERINO SHEEP** and **PEDIGREE BLACK WELSH CATTLE.**

HORSES, &c.

CATALONIAN JACKS.—Pure Catalonian Yearling Jacks from thorough-bred Imported Sire and Catalonia Jennies imported from Mexico, for Sale —MATABELE THOMPSON, Carnforth Hill Estate, Post Bag, Klipdam.

PIGS.

BERKSHIRE PIGS thorough-bred, pedigree boars and sows, from Imported stock, winners of numerous prizes. For particulars, apply to SUPERINTENDENT, Porter Reformatory, Tokai, P.O, Retreat.

PURE BRED BERKSHIRE PIGS. — Prize Winning Stock. Boars and Sows, £3 each.—Apply to THE MANAGER, Maitland River Farm, Green Bushes Hotel, Port Elizabeth.

THE POULTRY YARD.

Hazel, Rondebosch. PRIZE POULTRY.—Andalusian White Wyandottes, Brown Leghorns and Rocks. Stock and Sittings for Sale. Inspection and Correspondence invited, R. HAZELL, Tregenna, Park Road Rondebosch.

WYANDOTTES AND LEGHORNS. — Exhibition and Utility.—White and Silver Pencilled Wyandottes, White, Brown, Buff Leghorns, and White La Bresse. Special reductions during current month to make room for young stock.—**S. Smith. "Taiana," Wellington Avenue, Wynberg.**

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. MRS. W. L. STEEL, Croydon House, Faure, C.C.

WYANDOTTES.—(Silver, White, Partridge) HOUDANS, ROCKS (Barred, White). LEGHORNS (White, Brown, Buff). BUFF ORPINGTONS; BLACK MINORCAS, all hardy fully-matured breeders of the best laying strains. EGGS, GUARANTEED FERTILE. 10/- PER DOZEN, delivered nearest railway station. Cash or C.O.D. Single Stock Birds, breeding pens fit for coming season at reasonable prices. H. HEESE, Paarl.

THE

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Exportation of Ostriches and Ostrich Eggs to the Transvaal.

It is notified for general information that, whereas legislation has been enacted and promulgated prohibiting the exportation of Ostriches and Ostrich Eggs from the Transvaal, except to such South African States and Colonies as have enacted similar prohibitive legislation, the exportation of Ostriches and Ostrich Eggs from this Colony to the Transvaal is *ipso facto* permitted.

Mimosa Gum for Export.

Enquiries are being made in London, through the Commercial Agent, for Mimosa Gum, in commercial quantities. One offer quotes £25 per ton delivered c.i.f., Southampton.

Bacon Curing in Orange River Colony.

It has been decided to erect a modern Bacon Factory at Ladybrand, in Orange River Colony, from the designs of Messrs. Wm. Douglas & Sons, Ltd., of Putney, London. The factory will have all the modern equipment found to be so suitable in European factories. The inception of the idea is due to the Hon. W. J. Palmer, M.L.C., Director of Agriculture in the Colony, and the proprietor is the Hon. H. W. Stockdale, M.L.C. The whole of the plant necessary will be made and fitted up by the designers of the factory.

Shearing Tallies in Australia.

As many of our readers are now enquiring as to the use of the machine shear, the following particulars culled from an Australian paper should prove of interest, as showing what the machine is capable of in competent hands:—"The shearing just completed at Yancannia, Broken Hill, has been remarkable for big tallies. For the information of sheepowners generally, I am sending the last full week's work (5½ days) at this station, which will go to show the number of sheep a team of first-class shearers can put through. This work has been carried out by P. A. Nash & Co.'s team:—F. Horsburgh, total for week, 1,126; A. Horsburgh, 1,117; J. Elletson, 1,096; M. J. Murphy, 1,060; E. Horsburgh, 1,030; E. Fletcher, 906; W. Fry, 994; J. McIvor, 945; J. Radnedge, 975; D. Bradshaw, 979; J. T. Molloy, 921; J. Horrigan, 865; M. Murphy, 885; J. Brennan, 899; A. Dunn, 920; A. Rowley, 910; T. Kelly, 856; W. Murphy, 886; J. Swan, 894; E. Ash, 817; J. A. McBeth, 629; J. Latten (learner), 396; total, 20,196; average per man for week, 918. The team shore 109,626 sheep in 266 hours.

Locust Destruction.

Mr. H. Waldeck, of Olivewood, Colesberg, writes to the Government Entomologist:—Having very large swarms of locusts in this neighbourhood, I thought you would be interested to know what has been done to destroy them as far as possible. About the 10th of this month (October) they came out, and arsenite of soda was served out by the Civil Commissioner, as also pumps for spraying with, but we soon found that where the grass is scanty we did not accomplish much. We next made the mixture stronger by half, and then dipped green barley, oats, and wheat into this, and after letting it drain, strewed it about in the way of the locusts, by which means very large numbers were poisoned. Later we found that by putting the green stuff through a forage cutting machine, that you could sow the poisoned bait broadcast, and by making the mixture strong and sweet large swarms could be killed in a short space of time. I am giving you this information first because I know you are anxious to know how we have fared; secondly, because I think the spray pump is quite useless in the Karoo; and, thirdly, the information may be of use to other farmers.

A Hint to Farmers.

Now that farmers, with the assistance of Government, are earnestly considering ways and means of exterminating the locust, says the "Northern Post," the following hint taken from the *modus operandi* of Mr. Ben Alcock, son of Mr. Alex. Alcock, of Aliwal North, at his farm Klipplaatfontein, may be of assistance to those who are at work. When the locust is in the voetganger stage, it most persistently sticks to bridle paths and the edges of water furrows, and it is at this stage that Mr. Alcock's idea is effective. Instead of spraying the growing grass and veld, a quantity of green lucerne or barley is cut up and steeped in the solution of arsenite of soda and then placed along the paths and furrows along which the "hoppers" are generally to be found. This method has proved most successful, the locusts dying within an hour after attacking the preparation. One advantage gained by this means is the saving of arsenical solution, which if the veld is sprayed may not be touched by the locusts. Mr. Alcock's idea is simple, and farmers and others will do well to take a leaf from his book.

The Fruit Fly and Paraffine.

In the *Agricultural Journal* for February of the present year attention was directed to a new and promising measure for preventing the infestation of peaches and other fruits by maggots, namely, by the destruction of the adult flies through very lightly spraying the fruit trees with a poisoned solution of sugar or treacle. To those who will make use of this remedy during the coming season it is recommended that the mixture consists of one pound of arsenate of lead and not less than 18 pounds of treacle or sugar, with water to make up to twenty-five gallons. It may prove an advantage to increase the proportion of the poison, but it is not certain that more than the proportion given can be used on peach trees without somewhat injuring them. The lowest grade of Natal treacle, an article which costs in large quantities only about 6d. a gallon in Durban, is suitable, as is also the very lowest grade of sugar, such as is being purchased for locust work, at a price under 10s. a hundred pounds. Where the sweetening ingredient is low priced, it may pay well to increase its proportion even up to five gallons. Every tree to be protected should get a little of the spray, but only a coarse sprinkle here and there. As much as possible the touching of any fruit with the spray should be avoided.

But what may prove to be a far superior remedy than the poison spray is the trapping of the adult flies with paraffine oil, that is, the ordinary illuminating oil known in most English speaking countries as kerosene. This new remedy is a West Australia discovery. We first learned of it by an article in the West Australia *Journal of Agriculture* for April last. It appears that a farmer made the discovery, and that Government officers have fully verified it. The oil is said to have a peculiar attraction for this particular kind of fly, and the fly has only to touch the oil to be destroyed. The official report by the Government Entomologist, Mr. George Compere, says:—"Our experiments showed that there is nothing accidental in connection with their getting into the oil, but showed most clearly that the kerosene really attracted the flies. A vessel containing some kerosene was placed in the forks of a tree about eighteen inches above the ground, and at a point where ordinarily specimens of this kind of fly are never noticed. Within fifteen minutes after having placed the vessel in position dozens of the flies were noticed moving about the trunk of the tree making their way to the oil, and eighteen hours later Mr. Newman removed and counted 124 fruit flies from the one vessel. Female flies removed from the oil were found on examination to be full of eggs." To determine if other oils were similarly attractive, one of the officers of the W.A. Department of Agriculture experimented with turpentine, benzine, and naphtha, in connection with kerosene. Tins containing the substances were scattered about an orchard and allowed to remain undisturbed for twenty-four hours. His significant results were reported as follows: "Turpentine: Six tins used; two flies found in one, all the rest empty and dry. Benzine: Eight tins used; one fly in one and four in another; all the tins dry. Naphtha: Four tins used; no flies caught; all tins dry. Kerosene: Six tins used; 149 flies caught (every tin containing some); all tins moist." It is obvious that although the other oils may be somewhat attractive, they evaporate too rapidly to be of much use for traps.

The Eastern Province Entomologist has attempted to verify the attractiveness of the oil by an experiment at Grahamstown. Only a winter test has so far been possible. In his official September report he wrote:—"Began August 10th, using about two inches of paraffine in two shallow tins. Supported one tin on a stand four feet high right up against the branches of a tree, and placed the other on the ground against the trunk. The tree is a *Citrus buxifolia*, laden with fruit, and always with a number of fruit flies hovering around. The tins were examined twice daily, about 9.30 a.m. and 4 p.m. The number of fruit flies captured by the end of August was 40. Of these 36 were taken from the tin on the stand, and only four from the one on the ground. A large number of miscellaneous insects and spiders were also taken. The highest number of fruit flies taken in one day was five. At present I have only this one tree in the Botanic Gardens to experiment with, but as other fruits come on later I shall try to follow up the work."

In the West Australian article, a self-feeding metallic fountain, such as is used for supplying water to chickens, is figured as a suitable vessel for the capture of the flies. The vessel as illustrated is tilted forwards so that part of its bottom would be continuously supplied with oil, whilst the back part would be above the liquid. The evident object is to give the flies a convenient place on which to alight and approach the oil. Presumably any shallow vessel would answer the purpose. Sardine tins and shallow tobacco and fish tins suggest themselves, and such might be attached to a tree by a stout tack through the bent back cover.

Only the experience of years will show the value of these new remedies for the fruit fly. Because they act indirectly, and because the good effect due to them may be spread over many trees, it follows that it is very difficult to estimate the good they do. For three successive years, however, the poison spray has been used in a large orchard near Grahamstown with apparently very profitable results, and a very large scale experiment in Europe with a similar poison against an allied fly (olive fruit fly) resulted in getting a crop free from maggots, whilst in parts where the remedy was not employed the fruit was nearly all infested. Both oil and poison will probably be found to have the disadvantage of destroying large numbers of some kinds of insects it would be better to have live, but it is not likely that this objection to their use will prove serious. Mr. C. W. Mally, who was Eastern Province Entomologist before Mr. Dewar, the present officer, reported that the poison did not seem to attract bees.

The oil remedy is much more attractive than the other, owing to its not involving the use of a poison, and also because with its use one has the satisfaction of seeing what is killed. The poison might destroy a great number of flies and yet no dead ones be seen, and hence one be left in doubt whether the remedy was acting at all or not.

It may take considerable experience to show how numerous oil vessels must be in an orchard to secure the best results with their use. One can only guess now whether several in one tree is pronouncedly better than one to several trees. For a test, however, it is suggested that at least one to each full bearing tree should be used for the first season. If many flies are caught and the fruit found to escape the attack almost entirely, one would then be led to try one tin to two trees the following year; whilst if many flies were caught and the fruit nevertheless infested, it would be natural to try several tins to a tree in the next trial. It is probable that the results in a small garden in the vicinity of other gardens will be disappointing unless one of the remedies is applied in all. But if the oil measure proves fairly effective in isolated gardens, thus showing it would be efficacious in any town where it were thoroughly applied, one can imagine that in time our town and village rulers will be wise enough to employ an officer to set and keep traps in order in every fruit garden within their precincts. Hasten the happy day.—C.P.L.

Caution in the Use and Making of Ensilage.

At the request of Mr. F. Versfeld, Moutons Vlei, Piquetberg, Veterinary Surgeon R. Paine, F.R.C.V.S., of Elsenburg, forwards a brief account of some heavy losses which Mr. Versfeld has recently experienced, in the hopes that it may prevent similar losses to other stock farmers. Although these losses were connected with the making of ensilage, it must not be taken as condemnatory to this food when properly made and used with due caution, for it is undoubtedly in some districts of considerable economic value. The material used by Mr. Versfeld was Neapolitan wheat (Barley wheat), and was stored, some in the form of a stack and the remainder in a pit or silo. The horses and mules were allowed to eat as much of it as they wished, and save when out at work it was their main food from August 19th till September 6th, their other diet being the same quality oats and forage as had been in use since January. The stack was only two days old when first opened on August 19th, and finished by August 29th. For the next day or two green lucerne was used, and on September 2nd the pit was

opened and the material (now 16 days old) fed daily till the 6th of September. The first death occurred upon the 6th September, and by the 10th September 8 mules and 8 horses had died. The symptoms were rather vague, it being first noticed that the animal would grab at its food as if very hungry, but was unable to pass it back to the molar teeth for mastication; it was unable to swallow liquids or solids; subsequently it appeared to get very weak and unable to stand, death supervening within 12 to 24 hours. No evidence of pain, of diarrhœa, or of delirium was observed.

I was only able to hold one *post-mortem* examination, continues Mr. Paine, and found the main lesion to be congestion and inflammation of the greater part of the intestinal tract; the pain from the lesions was probably masked by the action of the material on the brain. Upon examining the food I found that it was not silage at all, but simply wet, mouldy, partially decomposed, green forage, and the deaths were, in my opinion, due to toxin poisoning (poisoning products manufactured by bacteria during decomposition), the action of the toxins having mainly affected the nervous system. Similar cases have been recorded by Varnell, who destroyed horses in 36 hours with mouldy oats, the principal symptoms being paralysis of the tongue and hindquarters, the main lesion, upon *post-mortem* examination, being inflammation of the bowels. In other cases recorded by Gamgee numerous deaths were caused by mouldy grass, the principal symptoms being acute intestinal trouble, delirium and paralysis. This experience may act then as a warning, not against the cautious use of good silage, but against feeding animals (especially horses and mules) upon any damaged or badly saved crop; for not only may heavy losses be incurred, but, even if the animals survive, the food is of comparatively little nutritive value, and usually causes a general unthriftiness and loss of condition.

Ostrich Farming in New Zealand.

A recent number of the *New Zealand Farmer, Stock and Station Journal*, received by Professor Duerden from a correspondent, contains a beautifully illustrated article descriptive of ostrich farming in New Zealand. It is stated that there are some half-dozen people in the Colony who have a few birds each, but it is only at the Helvetia Ostrich Farm, some twenty-eight miles South of Auckland, that the birds are reared in any numbers, or that the industry has assumed any really practical form. At the present time this farm has on it between 600 and 700 birds, and about 150 or 200 birds are reared each year. The method of conducting the industry has much of interest to the South African ostrich farmer. Some of the eggs are hatched out in incubators (Cypher's), and others by the parents, the first eggs being laid in August and the supply continuing until February. The birds are fed chiefly on chopped clover, cabbage, rape, and kale, the last named having been found to be particularly suitable; turnips are fed during late autumn and winter; practically no grain is given to any of the birds. In collecting the birds they are worked with a dog, much as sheep. To keep the birds in good condition a frequent change of ground is found to be necessary, as the land soon becomes foul where they are grazed thickly, and birds slightly "off-colour" are separated in a special camp.

The first plucking of feathers takes place when the bird is eight months old, and subsequent clippings at regular intervals of eight months, so that three clippings are obtained in two years. The feathers average in value from £2 10s. to £3 per bird. At the farm a staff of girls is kept, so that the feathers can be dressed and finished for the market, the blacks

only being sent to England to be dyed. In order to introduce new blood and improve the strain a dozen birds from Algeria were imported a few years ago.

Paspalum Grass.

In view of representations made by the Paarl Farmers' Association to have the railway rates reduced for Paspalum grass rootlets for transplanting, the General Manager Cape Government Railways has intimated to the Association that on and after the 11th inst. these plants shall be conveyed in local traffic over Cape Government Railways at the Class "B" (South African produce) rate, at owner's risk. It is interesting to note that orders for this grass are received from all parts of South Africa, and that very favourable reports are to hand of its successful growth wherever it has been tried.

Mr. J. H. King's Ram, "Don King.

We owe Mr. John Henry King, of Highland Home, Tarkastad, an apology, for crediting Messrs. Geo. King & Sons, of Wheatlands, with the ownership of his ram "Don King." The ram's photograph appeared in the September issue, and by an impardonable oversight was credited to the Wheatlands flock. "Don King" was bred by Mr. J. H. King at "Highland Home." He was eighteen months old when photographed, was 1st and champion at Grahamstown in 1906, and 1st in the class for Registered Sires at Port Elizabeth in 1907.

Agricultural Show Dates. 1908.

The following dates have been fixed for Agricultural Shows during the season 1908:--

Paarl, Thursday, January 23.
Stellenbosch, Thursday, January 30.
Robertson, Wednesday, February 12.
Malmesbury, Wednesday, February 19.
Aliwal North, Wednesday and Thursday, February 19 and 20.
Caledon, Thursday, February 20.
Bayville, Friday, February 21.
Richmond, Wednesday, February 26.
Western Province (Rosebank), Tuesday, Wednesday, and Thursday, February 25, 26, and 27.
Bathurst, Wednesday and Thursday, February 26 and 27.
Graaff-Reinet, Tuesday and Wednesday, March 3 and 4.
King William's Town, Wednesday and Thursday, March 4 and 5.
Middelburg, Wednesday, March 11.
East London, Thursday, Friday and Saturday, March 12, 13, and 14.
Cradock, Tuesday and Wednesday, March 17 and 18.
Grahamstown, Thursday and Friday, March 19 and 20.
Bloemfontein, Wednesday, Thursday and Friday, March 18, 19, and 20.
Port Elizabeth, Wednesday, Thursday and Friday, March 25, 26 and 27.

SHOWS FIXED BUT DATES UNDECIDED.

Queenstown either last week in February or first week in March. Cathcart probably first week in March.

FARM AND VELD.

Soda-Bordeaux Mixture.

The following letter from Mr. H. Hignell, of Old Morley, addressed to the Government Entomologist, telling of the successful substitution of soda-Bordeaux mixture for the ordinary preparation made from lime and copper sulphate may interest readers who require to use a fungicide, and who find it difficult to procure good lime:—"You asked, in a pamphlet bearing on potato culture, that if anyone tried Professor Halsted's soda-Bordeaux formula as a substitute for the standard Bordeaux mixture, he would communicate with you as to the results attained. The potato beetle was very troublesome here this year—in fact eating the haulms down to the ground. Having lost one crop, I tried to save the main crop by using Paris green combined with soda-Bordeaux. (Lime up here is as high in price as it is low in quality.) The spraying served its purpose very well. The fungicide and insecticide stayed well on the plants. As I had used Paris green alone on the crop I had practically lost, the Kafirs said: 'Qwouk! Xagoshi painted his potatoes green and that was not much good, now he's painting them blue.' The beetle was reduced to a negligible factor, and the haulms grew strongly. However, the season was too wet on this clay land for potatoes. I had the tubers lifted the moment they were ripe, but numbers of the Early Rose were rotten in the ground.; also many of the Magnum Bonums. The white potatoes, however, stood the damp much better. The Up-to-date's gave a good yield as regards number of potatoes per sett mostly seed size, however. Some Eldorados gave an extraordinary yield. I counted thirty-three potatoes to one sett and numbers between twenty and thirty were quite common, a little above seed size. Had the season been more favourable, and the land had done its part, I should have had amazing results. So I found soda-Bordeaux a success."

The formula for making soda-Bordeaux after Dr. Halsted's plan is:—

Water	40 Imp. gallons.
Copper Sulphate	6 pounds.
Caustic Soda, 98 to 100 per cent.	2 pounds.
Unslaked Lime	10 ounces.

The ingredients should be diluted and be cool at the time they are mixed. The sulphate and the soda might each be dissolved in fifteen gallons of water, and the lime mixed with ten and added last. The advantage of soda-Bordeaux over the ordinary preparation is that it is a safe fungicide even when prepared with an indifferent quality of lime, the stated weight of caustic soda being all sufficient to neutralize the copper sulphate. Ordinary lime may then be used with impunity, but as it is already slaked, a pound might be taken instead of ten ounces, in order to allow for the contained water.

We would be pleased to hear from anyone else who tries the substitution. Full details regarding it are given in a reprinted article from the *Journal*, under the title "Bordeaux Mixture," a copy of which is still procurable on application.

Caustic Soda and Sulphur Dip.

Several correspondents have written lately asking for particulars of the methods recommended by the O.R.C. Department of Agriculture for the preparation of the Caustic Soda and Sulphur Dip. In response to an enquiry, the Secretary for Agriculture at Bloemfontein has courteously placed the following information at our disposal:—The above dipping mixture has now been found by practical experiment to possess the qualities desirable, viz.: Ease and rapidity in preparation, harmlessness to sheep and wool, efficiency in eradicating scab.

METHOD OF PREPARATION.—The following directions for its preparation and use are published for information:—

5 lbs. caustic soda, 98-99 per cent.
20 lbs. best flowers of sulphur.
100 gallons of water.

Mix the sulphur with enough water to form a thin cream. Then sprinkle the caustic soda slowly into the cream, stirring the mixture thoroughly until all the soda is in, then in forty minutes the resulting fluid can be poured into the 100 gallons of water. The ingredients necessary to make a larger quantity than 100 gallons of dip should not be mixed in bulk. If, for instance, 1,000 gallons of dip are required, 10 lots should be made as above. Mixing in bulk is liable to result in the materials becoming caked and not properly dissolved. All lumps in the sulphur should be carefully broken up. *The mixture should on no account be boiled.*

Sheep should be kept in the dip two minutes and goats three minutes. Not a single case of failure to cure scab with this dip has been experienced by the O.R.C. Department, and one farmer has stated that he cured an exceedingly bad case of goat scab in one dipping.

EFFECT ON SHEEP AND WOOL.—The effect of this dipping mixture is beneficial both on the animal and the wool, but as some doubt exists regarding its action on wool, a reprint is given of a letter received from Mr. T. H. Moore, wool merchant, of Huddersfield, England, whose interesting lectures on wool in 1905 will be remembered, and who takes such a deep interest in the wool industry of the Orange River Colony.

Dundas Street, Huddersfield, Sept. 5, 1907.

To the Director of Agriculture, Orange River Colony.

From time to time I have reported upon samples of wool submitted by you from sheep which had been dipped in the caustic soda and sulphur dip, and on each occasion I have expressed the opinion that the wool had not suffered in any way from the action of the soda and sulphur. The

cheapness of this dip and its proved effectiveness in destroying scab will no doubt induce the farmers to adopt it generally. In view of this I thought it of supreme importance that scientific tests should be made with the object of definitely settling the question of injury to the fibre. Accordingly I have had a quantity of dip prepared on the basis of

5 lbs. caustic soda,
20 lbs. sulphur,
100 gallons water,

and with it the following experiments have been made:

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1. *Dyeing.*—Samples of yarn made from O.R.C. wool were immersed in the cold dip and allowed to become thoroughly saturated. They were then dried in the sun and dyed various colours. In each case along with another sample of the same yarn which had not been dipped. The various samples are sent you herewith. The dip gives the yarn increased attraction for dye stuffs, which of course is an advantage. A sample of greasy wool which was immersed in the dip, sun dried, then scoured and dyed, showed the same increased affinity for colouring matter. Repeated dipping emphasised the advantage.

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2. *Elasticity.*—The test of yarn for elasticity gave better results for the dipped than the undipped samples. This, I think, was due to the fact that the dipping caused a slight shrinkage in the fibre. Individual fibres of wool and five fibres twisted together (4¾ turns per inch) gave an opposite result, indicating a loss of elasticity of about 8 per cent.

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3. *Strength.*—The yarn samples showed a decrease in strength varying from 3 to 7 per cent. Individual fibres of wool and 5 fibres twisted together gave even greater decreases, varying from 17½ to 20 per cent.

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4. *Weight.*—Bearing in mind that a strong solution of caustic soda will dissolve wool entirely, I had several experiments made with immersions varying from one minute to one hour, sun dried and weighed as soon as dry, and re-weighed after the lapse of a week and again a month later. Contrary to expectation I found in every case an actual increase in weight. This varied from 4 per cent. to 7 per cent., after one minute's immersion (sun dried), to 7 per cent. after one hour's immersion. A week's exposure to the sun and atmosphere reduced again in weight about one per cent. A month later showed no further loss.

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5. *Summary.*—It must be borne in mind that these experiments were made with perfectly clean wool which had not the protection of the natural grease to withstand the action of the chemicals. I am of opinion that that shrinkage in elasticity and strength is of such a nature that it would not operate at all on the fleece of a live sheep. Whatever diminution in this respect which might be discovered immediately after dipping would disappear as soon as the grease had an opportunity to rise into the staple, say in a week or two's time, therefore in every respect the action of the dip is satisfactory. It assists the scourer and the dyer; it does not detract from spinning properties; and it helps the farmer by giving him increased weight of clean wool.

The greatest object of all, the eradication of scab, is so well understood by the farmers, that I need not enlarge on that.

I have the honour to be, Sir,

Your obedient Servant,

T. H. MOORE.

The above statement clearly proves that the wool is improved by dipping in this soda and sulphur mixture, and as it is an efficient scab eradicator, it is recommended by the O.R.C. Department of Agriculture for use to all sheep and goat farmers.

Damage done to Bees by Spraying Fruit Trees while in full bloom.

The Secretary to the Stellenbosch Fruit and Vine-growers' Association (Mr. Thomas E. Micklem) wrote recently to the Secretary for Agriculture as follows:—At a meeting of the Stellenbosch Fruit and Vine-growers' Association a resolution was passed: "That the Agricultural Department be requested to issue a pamphlet on the subject of the danger to bees of spraying fruit trees when in full bloom, pointing out that on account of (*i*) the benefits to the fruit derived from the fertilising agency of the bees, and the damage inflicted on the bees by poisonous sprays; (*ii*) the probable harm done to the delicate reproductive organs and pollen of the flowers themselves; (*iii*) the greater efficacy of spraying just after the petals have fallen and the fruit is setting, it is distinctly to the disadvantage of fruit-growers to spray their trees while in full bloom. We would also draw attention to the fact that in the United States, where the culture of fruit and bees is carried out on a very large scale, experiments on this subject have been conducted in numerous stations, and it has been conclusively proved that, apart from there being any necessity to spray trees while in full bloom, it is decidedly injurious to do so during this time. Consequently in a number of States laws have been enacted making it illegal to spray during blooming time. In Cape Colony, where, on account of the mild winter, bees are comparatively much more abundant than in the United States at that time, we would point out the still greater necessity for such regulations."

The Government Entomologist (Mr. C. P. Lounsbury) offers the following comment on the above:—The Department has no better channel than its *Agricultural Journal* in which to discuss such a subject as this, and I am pleased to have it brought up by a Fruit Growers' Association. My ideas on the matter were given in an article on lead arsenate, which was published in the issue of the *Journal* for August, 1906, but they will stand repetition. The chief object in spraying fruit trees in the easly spring is for protection against the Codling Moth, and as brought out in the communication above, there are three sides to the question, namely:

(1) The effect on the blossoms.
(2) The effect on the bees.
(3) The effect on the Codling Moth.

There is a difference of opinion amongst writers on the subject as to the effect on the blossoms, but I think it may safely be assumed that the effect is of little consequence, and almost wholly mechanical. However, such as there is must be of injurious nature; and it is probable that

arsenate of lead, because of its flocculency and adhesiveness, acts more injuriously than Paris green. The poison in either case is practically insoluble, so it is doubtful if it exerts any appreciable chemical effect when used at ordinary strength.

The effect on bees is of far greater importance. Bee-keepers in America have long claimed that colonies were seriously weakened, and in some cases killed out, by the spraying of trees they frequented when in bloom, but so far as I know there has been little direct experimentation on the subject, and opinions amongst experts have been divided. The Stellenbosch Association appears to have more complete information on the American conditions than I have, for I know of legislation prohibiting the spraying of trees when in bloom only in Montana, Colorado, and Ontario, and of conclusive experiments only in Ohio, and that thirteen years ago. However, the Ohio experiments and observations (*Insect Life*, 1894, p. 132) admitted only of the conclusions "that bees are liable to be poisoned by spraying the bloom of fruit trees, the liability increasing in proportion as the weather is favourable for the activity of the bees, and that all bloom must have fallen from the trees before the danger will have ceased." It was shown that not only the workers but the brood in uncapped cells were liable to death. It must therefore be clearly apparent that spraying trees in bloom endangers bee colonies that frequent the orchard.

The effect on the Codling Moth is the phase of greatest importance to the fruit grower, and to express it curtly, that effect is practically *nil* so far as the protection of the fruit still in the bloom stage is concerned. The poison which lodges on the blossoms is nearly all shed, and most of the little that remains is where no Codling Moth larva will ever find it, namely, on the withered stamens.

Hence the blossoms, the bees, and the Codling Moth, all considered, the time to start spraying is shortly *after the blooms have fallen.* Then poison can lodge in the little obstructed calyx cups (blossom ends) of the newly-formed fruit, and there be ready for the enemy. It seems possible that a few larvæ enter, forming fruit before the bloom falls, but such must perish through insufficiency of food or crawl to larger fruits, and hence require no consideration. A most unfortunate factor in the matter, under our Cape conditions, however, is the excessive duration of the blossoming period. It commonly happens that a goodly number of apples and pears on a tree may measure up to an inch in diameter, and some already contain larvæ whilst blooms are still present. What then is the grower to do, study the bee-owner's interest or his own? My advice has been for him to go ahead with his spraying as soon as the majority of the fruits are ready, notwithstanding the liability of poisoning the bees. If practical fruit growers think me wrong to urge this policy, they are invited to express their views in the *Journal.* Likewise it will be of interest to us all to hear of actual facts regarding ill-effects of spraying on bees. I do not think there is need of regulations.

The Duration of Kraal Infection for Scab.

The Chief Inspector of Sheep (Mr. Alan G. Davison) reports:—As the period for which any kraal may be deemed a danger and source of infection to clean stock after scabby sheep or goats have been removed from it

has always been a matter of doubt and speculation, I arranged to carry out certain experiments on the farm Karreepoortje, the property of Mr. Henry Nash, in the district of Jansenville. On the 26th May, 1906, I visited this farm and examined an old kraal which had not been used for some weeks. It appears from statements made, not only by the present occupier, but also by those who had previously resided on Karreepoortje, that this particular kraal had for the last fifteen or twenty years always been considered a source of danger to clean stock. In 1902 the dung was burnt, and at the date of my visit the average depth of manure was about two feet. Mr. Birch, the present occupier of the farm, informed me that in January, 1906, he separated the ewes and kids in a certain flock of Angora goats, which were quite free from scab. The ewes, 700 in number, were placed in the kraal I have mentioned, and kids were sent to an outstation some distance away. Within two months three of the goat ewes developed scab, whilst the kids remained clean.

The goat ewes were at once removed, and since the end of March, 1906, the kraal had been abandoned. At the date of my visit (26th May, 1906) I found the bush fences on three sides of the kraal very much broken, the south side being bounded by a krantz from 15 to 20 feet in height, and under this rock a cave extended for from 10 to 15 feet, nearly the whole length of the kraal. In the cave the dung was fairly dry and hard, whilst that outside the shelter of the rock was damp and soft. Arrangements were made to have the whole kraal, including the old bush fence, enclosed with barbed wire and netting of such a nature that no stock could possibly enter the kraal. In order to make the experiment as complete as possible, the kraal was divided by cross fences into five sections, so that each paddock might be used at different intervals. On the 11th August I again visited Karreepoortje, and found that the fencing had been satisfactorily completed.

On the 22nd March last I examined a flock of Angora goats at Karreepoortje, which were found to be quite free from scab, and 100 of these goats were selected, marked with a distinguishing brand, and allowed to sleep in the western section of the kraal, which is 84 by 57 feet in extent. The surface of the kraal was found to be thickly covered with weeds and grass, which were uprooted, and during the first two months, dating from the 22nd March, the dung was loosened and turned over three times. On the 13th May Mr. Birch, who resides at Karreepoortje, reported that one of the goats showed signs of scab. The existence of the disease was confirmed by the local Inspector, who found three scab insects on the animal in question. On the 15th June the 100 goats were taken from the kraal, when four more animals were found to be infected with scab. The remainder of the flock from which the infected goats were taken, and which numbered 502, remained perfectly free from scab, and up to the 26th July were still in this state. It thus appears that the kraal which had not been used since the end of March, 1906, must have retained infection for a period of twelve months; or to be more precise, and taking the date on which the fencing round the kraal was completed as the 11th August, 1906, seven months elapsed before any stock were placed in the kraal, and nine months expired before any signs of scab appeared among the goats kept in the kraal. During the experiment the 100 goats were kept entirely separate from the main flock, and slept every night in the kraal.

Retention of Infection of Scab in Abandoned Kraals.

The Chief Inspector of Sheep (Mr. Alan G. Davison) reports:—The following experiment in connection with old kraals has been carried out on the farm Swart River, the property of Mr. P. Swart, in the District of Caledon: I was informed that a certain kraal on this farm was considered a sure source of infection, and on the 27th of September, 1906, in company with Mr. P. Swart and Sheep Inspector Immelman, I visited the said kraal, which was found to be enclosed with wire, plaited with bush, and measured 105 feet by 45 feet, with an average depth of 4 inches of dung. Arrangements were made with Mr. Swart, who kindly placed the kraal at my disposal, to close it for a period of six months. One of Mr. Swart's flocks of sheep, numbering 800, which occupied the kraal, was examined on the 25th of October, when quite 7 per cent. of the animals showed visible scab. These sheep were dipped and sent to another part of the farm, the kraal being closed on the 16th November last.

On the 17th of May, 1907, the kraal was opened and the dung disturbed to a depth of 2 inches. A flock numbering 486 sheep with 60 goats was allowed to sleep in it every night, being kept separate from all other stock during the day time. These sheep were carefully examined by Inspector Immelman on the 29th April, as well as when placed in the kraal, and were found to be perfectly free from scab. Unfortunately Mr. Swart, owing to the lambing of his sheep, and lack of herds, could not allow a portion of the flock to be kept for control purposes. On the 27th June these sheep were examined by Assistant Smuts and Inspector Immelman, when eleven animals were found to be suffering from scab, six of them having spots varying in size from a threepenny to a shilling piece. It appears, however, that the herd who looked after the flock first noticed scab on the 19th June, which shows that 33 days elapsed before infection took place, and that, although the kraal had been closed for six months, it still retained the germs of infection.

Garden Notes—December.

Potatoes of late sorts (imported seed) may be put in now. French beans, for a late crop, can be put in where the land is suitable. Where there is suitable land cauliflower plants, if strong enough, should be planted out for an early crop.—E.P.

THE ECONOMICAL USE OF WATER IN IRRIGATION AND THE MEASUREMENT OF STREAM AND IRRIGATION FURROW DISCHARGES.

By F. E. Kanthack, Director of Irrigation.

In South Africa farmers have hitherto paid very little attention to economy in the use of water for irrigating crops. From the agricultural point of view, nearly every crop has its own critical depth of flooding, varying in a given crop with the nature of the soil, beyond which further flooding is directly harmful. From an economical point of view it is seldom advisable to approach this limit closely. Up to a certain point quality and quantity of outturn increase directly as the volume of water poured on to the crop. For a while the rate of increase remains constant, it then gradually decreases until further flooding produces no increased outturn. Finally a still further increase in flooding produces temporary or permanent deterioration of crop and soil. The farmer should in every case determine by careful experiment what amount of water is required by his various crops, as grown on different soils on his farm.

Where his irrigable lands are extensive as compared with his available water supply, it is of the greatest importance for him to determine the critical economical amount of water which he should apply to different crops. That is, he should find out the volume of water per acre or morgen of crop which if increased would give a better return on new land than by an increase in outturn on the original area irrigated.

Where water is derived from expensive storage reservoirs, or from pumping plants, the economical use of water is of special importance. Farmers have frequently replied, with reference to these arguments, that they are unable to measure the discharge flowing on to their fields, and ask how they should know when a flooding equivalent to, say, a 3-inch watering by volume, has been given. It is obvious that a farmer should first be able to measure the flow of water in his furrow, and, if he is working on uniform land, with an even slope and with "beds" or checks of uniform size and not too large, he will soon learn to judge the depth of flooding by noting the time it has taken to flood a given area, when the water in his furrow is running with a certain depth of water.

When it is desired to measure the flow of water in a small furrow, which does not exceed 2 cubic feet per second, called "cusecs" for short, then a triangular notch is the simplest contrivance. The notch should be cut to a true right angle with its apex down. It may be cut out of well-seasoned wood, and the two sloping sides of the triangle should be chamfered or cut away from one edge to an angle of forty-five degrees. When erected the sharp edge should face upstream, with the chamfer facing down stream.

It is essential that all gauging notches should work with a free fall; that is, for all supplies likely to be run, the apex of the notch should be at least nine inches, and, if possible, one foot above the water surface in the

furrow below the notch. If a one-foot fall is not available, then two separate notches may be used, placed well apart, so as to get the required discharge with a less depth over the sill. For accurate gauging, the water above the notch should be headed up so as to form a still pond, and thus reduce the velocity of approach, which, if considerable, necessitates corrections in the discharges as given by the ordinary notch formula.

The notch should be fixed in a straight reach of the stream or furrow to be gauged, which should be free from obstructions likely to cause eddies or cross currents. The notch should be fixed at right angles to the flow, and a line drawn through the apex, bisecting the right angle, should be truly plumb. The depth of water flowing over the notch should be read on a gauge erected truly vertical three feet above the notch and graduated to read to one-hundredths of a foot. The zero of the gauge must be at the exact level of the apex of the triangular notch. The discharge of such a notch, working from a still pond above it, is given in the table below:—

Table of Discharges.

h = gauge reading in feet.

Discharge in cusecs: 1 cusec = 6·24 gollons per sec., or 374·4 gallons per minute.

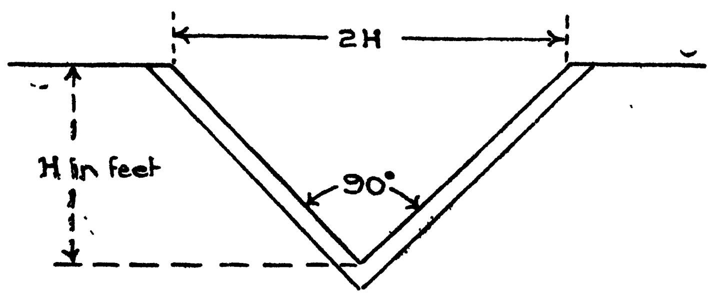


Table I.

h	Discharge.	h	Discharge.	h	Discharge.	h	Discharge.
0·1	·01	0·44	0·33	0·65	0·87	0·86	1·74
0·2	·04	0·45	0·35	0·66	0·90	0·87	1·79
0·25	·08	0·46	0·37	0·67	0·93	0·88	1·84
0·26	·09	0·47	0·39	0·68	0·97	0·89	1·89
0·27	·10	0·48	0·41	0·69	1·01	0·90	1·95
0·28	·11	0·49	0·43	0·70	1·04	0·91	2·00
0·29	·12	0·50	0·45	0·71	1·07	0·92	2·05
0·30	·13	0·51	0·47	0·72	1·11	0·93	2·11
0·31	·14	0·52	0·50	0·73	1·15	0·94	2·17
0·32	·15	0·53	0·52	0·74	1·19	0·95	2·23
0·33	·16	0·54	0·55	0·75	1·23	0·96	2·29
0·34	·17	0·55	0·57	0·76	1·27	0·97	2·35
0·35	·18	0·56	0·60	0·77	1·31	0·98	2·41
0·36	·20	0·57	0·62	0·78	1·35	0·99	2·47
0·37	·21	0·58	0·65	0·79	1·40	1·00	2·54
0·38	·23	0·59	0·68	0·80	1·45	1·01	2·60
0·39	·24	0·60	0·71	0·81	1·49	1·02	2·66
0·40	·26	0·61	0·74	0·82	1·54	1·03	2·73
0·41	·27	0·62	0·77	0·83	1·59	1·04	2·80
0·42	·29	0·63	0·80	0·84	1·64	1·05	2·87
0·43	·31	0·64	0·83	0·85	1·69	1·06	2·93
						1·07	3·00

For measuring accurately the flow of water exceeding two cusecs, or, say, 750 gallons per minute, a trapezoidal notch should be used. When water flows through a sharp edged notch, or orifice, the jet of water discharged is smaller than the full section of the notch, in consequence of contraction at the surface, at the ends, and along the crest. The crest and surface contractions are proportional to the length of the crest of the notch, and are allowed for in the ordinary notch formula, but the end contractions remain constant, no matter what width the notch may be. In the case of rectangular notches, end contractions must be allowed for by a correction co-efficient which has been determined by experiment. To avoid this complication the notch may be made trapezoidal, such that the discharge through the added areas in the triangular portions on each side just counterbalances the decrease due to the end contraction. A trapezoidal notch designed in this manner is named after its inventor, and is called a Cippoletti weir.

A sketch of a Cippoletti weir is attached. In using the weir the following conditions should be closely adhered to: —

(1) The channel leading to the weir should be straight and of fairly constant cross section. Its axis should pass through the middle of the weir, and the weir should be at right angles to it. The water, as it approaches the weir, should flow with uniform velocity and be free from eddies.

(2) The edges of the notch should be cut away down stream, at an angle of 45 degrees, as already described for a triangular notch.

(3) The distance of the sill of the weir from the bottom of the stream or furrow should be at least twice, or, better, three times the depth on the weir, and the distance from the sill to the water surface on the down-stream side must be not less than nine inches; that is, the fall must be free. The water must fall clear of the weir wall below the notch, so that air may circulate freely underneath, and the "backlash" caused by the jet of water impinging on the water down-stream must not foul the sill.

(4) The distance of the sides of the notch from the sides of the channel should be at least twice the depth of water on the weir.

(5) The length of the weir should be at least three, or, better, four times the depth of the water flowing over it.

(6) The velocity of approach must be small. For weirs 3 feet long and depth 12 inches it ought not to be greater than six inches per second; for weirs 6 feet long and depth of 24 inches it should not be above eight inches per second. To attain this, the water should be ponded up above the weir. The cross sectional area of the channel immediately above the weir should be at least seven times that of the notch.

(7) The depth of water flowing over the notch should be read on a gauge, erected truly vertical, three feet upstream of the notch and graduated to read to one-hundredth of a foot. The zero of the gauge must be at the exact level of the sill of the notch.

For very small discharges this type of notch will not give accurate results, and in such cases the triangular notch should be used for gauging.

Table II. shows the discharge over such weirs of various lengths and for different depths, when discharging from a still pond. To obtain extreme accuracy a correction must be made for the velocity of approach, and Table III. shows these corrections, in percentages, for velocity of approach to be applied to the values obtained from Table II.

The velocity of approach should be measured by timing the passage of a small stick or cake of dung between two stakes placed 20 feet apart just above the notch. The floats should be thrown gently into the centre of the stream, several feet above the upper observing stake. The average of at

least three readings should be taken, and the velocity in feet per second calculated by the following rule.

Velocity of approach in feet per second is equal to 20 feet divided by average time taken by floats in passing from one upper to lower stake.

When it is desired to ascertain the approximate discharge of an irrigation furrow or stream at a particular time, without going to the trouble and expense of erecting a notch, the following simple method may be adopted:

Select a straight reach of the furrow or stream with as even a grade as possible, having a uniform cross-section free from rubbish, such as large stones, snags or projecting bushes. The stream should be straight and uniform for about 40 or 50 feet. Near the lower end of this reach, mark off a run of 20 feet by means of sticks on the banks. The sticks should be put in on each bank, so as to mark off two straight lines truly at right angles to the direction of the stream. In the centre of the run mark off a third line in the same manner. Determine the cross section of the stream at this central point by measuring the depth of water at regular intervals across the channel. The average of these is obtained by adding them together and dividing by the number of measurements taken. Then the average depth multiplied by the width at water surface will give the area of the cross-section. All measurements should be made in feet and decimals, or fractions of a foot. Next, to find the mean velocity, throw a chip of wood or small flat cake of dry cow-dung into the centre of the stream, about 10 feet above the upper mark. When the float passes the upper mark, note the time by the seconds' hand of a watch. When the float reaches the lower mark, 20 feet lower down, again note the time, and the difference between the two times will give the time taken by the float to traverse the 20 foot length of run. Repeat this five times, and take the mean by adding all the results together and dividing by five. To ascertain the velocity of the stream in feet per second, divide the length of run, *i.e.*, 20 feet, by average time in seconds taken by the float in traversing this distance. Thus, suppose it took ten seconds for the float to travel the 20 feet, then in one second the stream would travel twenty divided by ten or two feet per second. This is the central surface velocity, and to find the mean velocity multiply the result by 0·7. It must be remembered that friction between the water and the surface of the furrow causes the velocity to be much less at the sides and along the bottom than in the centre at the surface, and experiments have shown that the mean velocity in a furrow is from 0·7 to 0·8 times the central surface velocity.

Having determined the mean velocity, multiply this by the area of cross section as previously determined, and the result will be the discharge of the furrow or stream in cusecs or cubic feet per second.

For the better understanding of discharges, expressed in cusecs, the following data may be useful:

1 cusec or cubic foot per second	= 6·24	gallons	per second.
	= 374·4	„	minute.
	= 22,464	„	hour.
	= 539,136	„	24 hours.

One cusec flowing steadily will cover almost exactly one acre, supposing there be no absorption by the soil, one foot deep in twelve hours, or three acres four inches deep in the same time.

A cusec running steadily for twelve hours represents one acre foot of water used.

F. E. Kanthack, Director of Irrigation.

Office of the Director of Irrigation,
Parliament Street, Cape Town, July 20, 1907.

Table II.

Discharge over Cippoletti's Trapezoidal Weir of various lengths and depths.

Depth of Water on Crest.		Discharge in Cubic Feet per Second.							
In Inches.	In Feet.	1 Foot Long	1½ Feet Long.	2 Feet Long.	3 Feet Long.	4 Feet Long.	5 Feet Long.	7 Feet Long.	10 Feet Long.
·3	·025	·0135	·0202	·0269	·0404	·0539	·0673	...	·1347
·6	·05	·0367	·0566	·0754	·1131	·1508	·1885	...	·3771
·9	·075	·0690	·1035	·1380	·2071	·2761	·3451	...	·6902
1·2	·10	·1064	·1596	·2128	·3192	·4256	·5319	...	1·0639
1·5	·125	·1488	·2232	·2976	·4464	·5952	·7440	...	1·4881
1·8	·15	·1956	·2934	·3912	·5868	·7824	·9780	...	1·9560
2·1	·175	·2464	·3697	·4929	·7393	·9858	1·2322	...	2·4644
2·4	·20	·3010	·4515	·6020	·9029	1·2039	1·5049	...	3·0098
2·7	·225	·3592	·5388	·7184	1·0777	1·4369	1·7961	...	3·5922
3·0	·25	·4208	·6312	·8417	1·2625	1·6833	2·1041	...	4·2083
3·3	·275	·4855	·7282	·9709	1·4564	1·9419	2·4273	..	4·8547
3·6	·30	·5531	·8297	1·1063	1·6594	2·2126	2·7657	...	5·5314
3·9	·325	·6238	·9358	1·2477	1·8715	2·4954	3·1192	...	6·2384
4·2	·35	·6972	1·0459	1·3945	2·0917	2·7890	3·4862	...	6·9724
4·5	·375	·7730	1·1595	1·5460	2·3190	3·0920	3·8649	...	7·7299
4·8	·40	...	1·2777	1·7035	2·5553	3·4071	4·2588	...	8·5177
5·1	·425	...	1·3993	1·8658	2·7987	3·7316	4·6645	...	9·3290
5·4	·45	...	1·5246	2·0328	3·0492	4·0656	5·0820	...	10·1640
5·7	·475	...	1·6534	2·2045	3·3067	4·4089	5·5112	...	11·0225
6·0	·50	...	1·7854	2·3805	3·5708	4·7610	5·9512	...	11·9025
6·3	·525	...	1·9210	2·5614	3·8420	5·1227	6·4034	...	12·8068
6·6	·55	...	2·0599	2·7465	4·1198	5·4930	6·8663	...	13·7326
6·9	·575	...	2·2018	2·9357	4·4036	5·8715	7·3393	...	14·6787
7·2	·60	...	2·3472	3·1293	4·6939	6·2585	7·8231	...	15·6463
7·5	·625	...	2·4955	3·3274	4·9911	6·6548	8·3185	...	16·6370
7·8	·650	...	2·6462	3·5283	5·2924	7·0565	8·8206	...	17·6413
8·1	·675	...	2·8007	3·7343	5·6014	7·4686	9·3357	...	18·6715
8·4	·70	...	...	3·9437	5·9156	7·8874	9·8593	13·8030	19·7186
8·7	·725	...	...	4·1565	6·2347	8·2930	10·3912	14·5457	20·7824
9·0	·75	...	...	4·3733	6·5599	8·7466	10·9332	15·3065	21·8675
9·3	·775	...	...	4·5942	6·8912	9·1883	11·4854	16·0796	22·9708
9·6	·80	...	...	4·8177	7·2265	9·6354	12·0442	16·8619	24·0885
9·9	·825	...	...	5·0453	7·5679	10·0906	12·6132	17·6585	25·2264
10·2	·85	...	...	...	7·9154	10·5538	13·1923	18·4692	26·3846
10·5	·875	...	...	...	8·2669	11·0225	13·7781	19·2893	27·5562
10·8	·90	...	...	...	8·6234	11·4978	14·3723	20·1212	28·7446
11·1	·925	...	...	...	8·9850	11·9800	14·9749	20·9649	29·9499
11·4	·95	...	...	...	9·3516	12·4688	15·5860	21·8204	31·1720
11·7	·975	...	...	...	9·7233	12·9644	16·2054	22·6876	32·4019
12·0	1·000	...	...	...	10·1000	13·5667	16·8333	23·5667	33·6667
12·3	1·025	...	...	...	10·4808	13·9744	17·4679	24·4551	34·9359
12·6	1·05	...	...	...	10·8666	14·4888	18·1110	25·3554	36·2220
12·9	1·075	...	...	...	11·2575	15·0100	18·7624	26·2674	37·5249
13·2	1·10	...	...	...	11·6524	15·5365	19·4206	27·1888	38·8412
13·5	1·125	...	...	...	12·0513	16·0684	20·0855	28·1198	40·1711
13·8	1·15	...	...	...	12·4553	16·6071	20·7588	29·0624	41·5177
14·1	1·175	...	...	...	12·8644	17·1525	21·4406	30·0168	42·8812
14·4	1·20	...	...	...	13·2764	17·7019	22·1274	30·9784	44·2548
14·7	1·225	...	...	...	13·6936	18·2581	22·8226	31·9517	45·6453
15·0	1·25	...	...	...	14·1148	18·8197	23·5246	32·9344	47·0492
15·3	1·275	...	...	...	14·5410	19·3880	24·2349	33·9289	48·9699
15·6	1·30	...	...	...	...	19·9603	24·9503	34·9305	49·9007
15·9	1·325	...	...	...	...	20·5394	25·6742	35·9439	51·3484
16·2	1·35	...	...	...	...	21·1238	26·4047	36·9666	52·8095
16·4	1·375	...	...	...	...	21·7123	26·1404	37·9966	54·2808

TABLE II.—(*Continued.*)

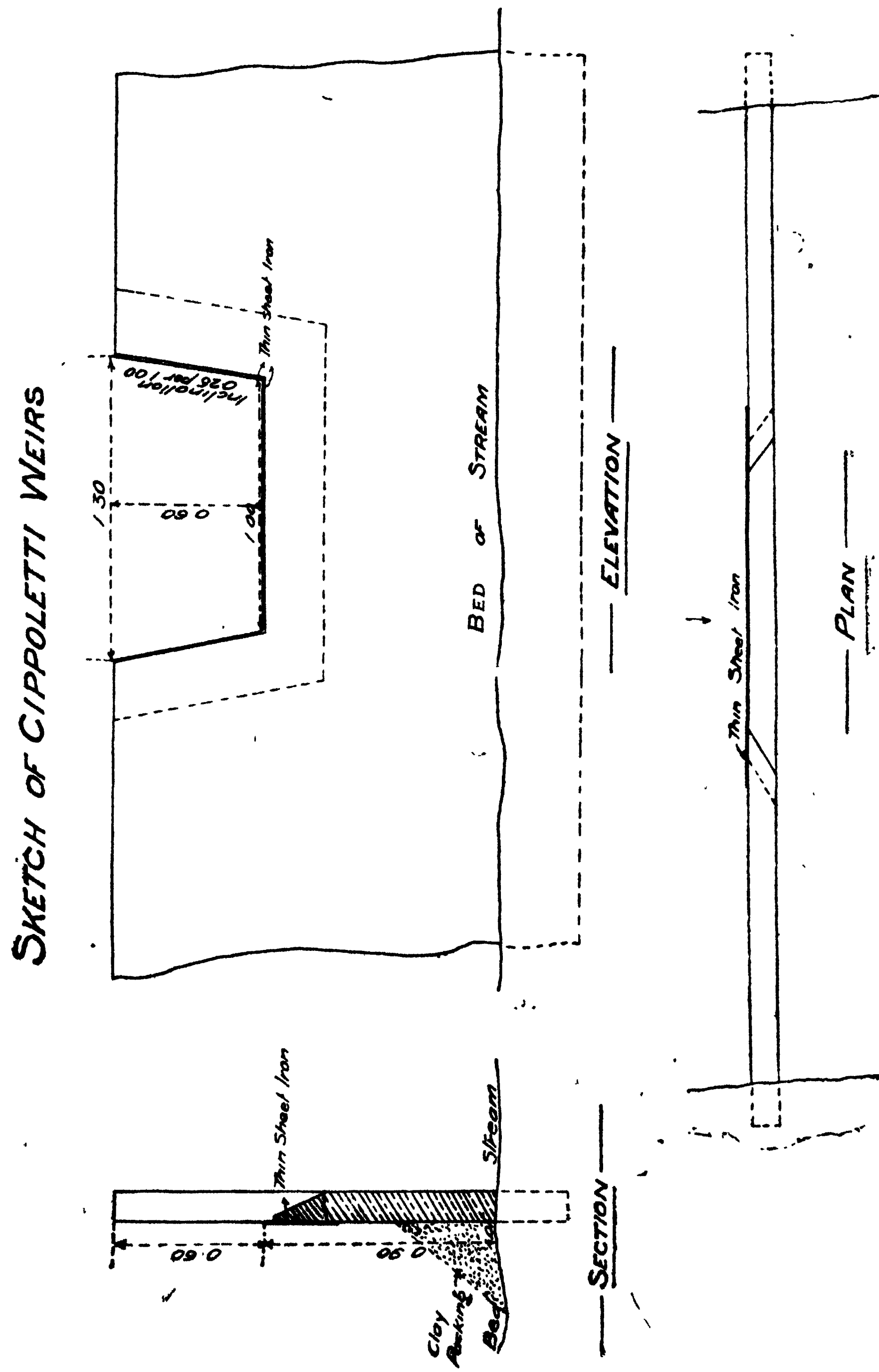
Depth of Water on Crest. In Inches.	Depth of Water on Crest. In Feet.	Discharge in Cubic Feet per Second. 1 Foot Long	1½ Feet Long.	2 Feet Long.	3 Feet Long.	4 Feet Long.	5 Feet Long.	7 Feet Long.	10 Feet Long.
16·8	1·40	...	...	...	...	22·3075	27·8844	39·0382	55·7688
17·1	1·425	...	...	...	...	22·9082	28·6352	40·0893	57·2704
17·4	1·45	...	...	...	...	23·5128	29·3910	41·1474	58·7820
17·7	1·475	...	...	...	...	24·1242	30·1552	42·2173	60·3105
18·0	1·50	...	...	...	...	24·7396	30·9245	43·2943	61·8490
18·3	1·525	...	...	...	...	25·3604	31·7005	44·3808	63·4011
18·6	1·55	...	...	...	...	25·9866	32·4833	45·4766	64·9666
18·9	1·575	...	...	...	...	26·6182	33·2727	46·5818	66·5455
19·2	1·60	...	..	...	...	...	34·0685	47·6959	68·1370
19·5	1·625	...	...	...	...	...	34·8702	48·8183	69·7405
19·8	1·650	...	...	...	...	...	35·6782	49·9495	71·3565
20·1	1·675	...	...	...	...	...	36·4913	51·0878	72·9826
20·4	1·70	...	...	...	...	...	37·3111	52·2355	74·6222
20·7	1·725	...	...	...	...	...	38·1376	53·3926	76·2752
21·0	1·75	...	...	...	...	...	38·9691	54·5568	77·9383
21·3	1·775	...	...	...	...	...	39·8074	55·7304	79·6149
21·6	1·80	...	...	...	...	...	40·6515	56·9121	83·3030
21·9	1·825	...	...	...	...	...	41·5009	58·1013	83·0018
22·2	1·85	...	...	..	...	...	42·3577	59·3008	84·7154
22·5	1·875	...	...	...	...	...	43·2179	60·5031	86·4358
22·8	1·90	...	...	...	...	...	...	61·7211	88·1730
23·1	1·925	...	...	...	...	...	...	62·9442	89·9203
23·4	1·95	...	...	...	...	...	...	64·1720	91·6743
23·7	1·975	...	...	...	...	...	...	65·4116	93·4452
24·0	2·00	...	...	...	...	...	...	66·6560	95·2228
25·5	2·125	...	...	...	...	...	...	72·999	104·289
27·0	2·25	...	...	...	...	...	...	79·541	113·63
28·8	2·40	...	...	...	...	...	...	87·619	125·18
30·0	2·50	...	...	...	...	...	...	93·156	133·07

TABLE III.

Corrections in per cent. for velocity of approach.

Velocity.	Head.*	Depth over Weir in Feet. ·25	·50	·75	1·00	1·25	1·50	1·75	2·00	2·25	2·50	2·75	3·00
·25	·0010	00·8	00·4	0·3	0·2	0·2	0·1	0·1	0·1	0·1	0·1	0·1	0·1
·50	·0039	03·5	1·8	1·2	0·9	0·7	0·6	0·5	0·4	0·4	0·3	0·3	0·3
·75	·0087	08·0	4·0	2·6	2·0	1·6	1·3	1·1	1·0	0·9	0·8	0·7	0·7
1·00	·0155	14·3	7·1	4·7	3·5	2·8	2·3	2·0	1·8	1·6	1·4	1·3	1·2
1·25	·0243	22·6	11·1	7·4	5·5	4.4	3·7	3·1	2·7	2·4	2·2	2·0	1·8
1·50	·0350	33·1	16·1	10·7	8·0	6·4	5·3	4·5	4·0	3·5	3·2	2·9	2·6
1·75	·0476	45·7	22·2	14·6	10·9	8·7	7·2	6·2	5·4	4·8	4·3	3·9	3·6
2·00	·0622	60·9	29·2	19·2	14·3	11·4	9·5	8·1	7·1	6·3	5·6	5·1	4·7
2·25	·0787	78·6	37·4	24·5	18·2	14·5	12·0	10·3	9·0	8·0	7·2	6·5	6·0
2·50	·0971	99·1	46·7	30·5	22·6	18·0	14·9	12·7	11·1	9·9	8·9	8·0	7·4
2·75	·1175	121·8	56·9	37·0	27·4	21·8	18·0	15·4	13·4	11·9	10·7	9·7	8·9
3·00	·1398	149·4	69·1	44·8	33·1	26·2	21·7	18·5	16·1	14·3	12·8	11·7	10·7
3·25	·1641	179·6	82·3	53·1	39·1	30·9	25·6	21·8	19·0	16·9	15·1	13·7	12·6
3·50	·1903	213·5	96·9	61·7	45·7	36·1	29·9	25·4	22·2	19·6	17·6	16·0	14·6
3·75	·2185	251·3	113·0	72·3	53·0	41·8	34·5	29·4	25·6	22·6	20·3	18·4	16·8
4·00	·2486	293·1	130·7	82·6	60·9	47·9	39·5	33·6	29·2	25·9	23·2	21·0	19·2

* Head $= \frac{V^2}{64 \cdot 36,}$ V being velocity in feet per second, in first column.


SKETCH OF CIPPOLETTI WEIRS
Thin Sheet Iron
Inclination 0.26 per 1.00
1.30
0.60
1.00
BED OF STREAM
ELEVATION
Thin Sheet Iron
PLAN
Thin Sheet Iron
Stream
0.60
0.90
Clay Packing
Bed
SECTION

EXPERIMENT STATION REPORTS.

KNYSNA ("EDINBURGH") EXPERIMENTS.—No. I.

By Eric A. Nobbs, Ph.D., B.Sc., Agricultural Assistant.

The Introduction of New Crops.

Knysna enjoys a climate obviously capable of developing to the greatest perfection a luxuriant and varied flora, as is abundantly manifested by the rich beauties of the forests, where a few gigantic specimens are still preserved to show what has been, and by the wealth of flowers on the veld and the rankness of vegetation everywhere. The obvious possibility at once presents itself that perhaps by artificial introduction some crop may be met with which will also find congenial surroundings and grow to perfection under these conditions. The converse proposition, that of utilising existing natural plants for industrial purposes, will be considered specially later on. The number of known cultivated plants is vast, and even of those which may possibly succeed under the conditions of Edinburgh very great. Probably every year additions will be made to those deemed worthw of trial. One year's growth is hardly sufficient to enable an opinion to be formed, but those tried can already be grouped into classes which have done well, which are promising, and which deserve further trial, and into doubtful ones. One camp is devoted exclusively to such trials. The ground is well worked by spade and lightly manured. The sowings are periodical, monthly and even fortnightly, at the principal seasons in order to give every opportunity to the plants under trial; though discretion was, of course, exercised regarding the known seasons of certain crops. In all some ninety-two different plants were tried, and of some several varieties. The progress of each sowing was watched. Much labour is involved in attending to so many small beds, but the results attained are highly gratifying. In their first season quite a number of crops tried gave evidence of succeeding well, and these will in the coming season be dealt with on a field scale under ordinary farm conditions. Others will receive extended trial, being sown at such seasons as have shown themselves to be the proper ones. The remainder will be given further trial, although a number are likely ultimately to be discarded. Owing to the small size of the beds, necessary in view of frequent sowings, it would be misleading to mention the yield in pounds per acre. This can only be done when plots of ½ acre or more are sown at seasons shown by the experience of the past year to be the most appropriate and in a manner practicable on a larger scale.

Leguminous Crops.

Serradilla.—This crop has undoubtedly proved a great success at Edinburgh, and its cultivation on a large scale will now be proceeded with. This is all the more satisfactory since Serradilla is a most valuable fodder, nutritious and palatable, and itself an improver of the soil on which it

grows. Serradilla has now been sown fortnightly throughout a year, and all sowings, except those in October and November, have done well, those of April and August proving best. Sown on bush soil with 300 lbs. of guano per acre it has given two good cuts, being all used for green fodder, the purpose for which it is best adapted. For the first couple of months it grows very slowly, then rapidly advances, flowers profusely, and is, *inter alia*, one of the best honey flowers known. It is cut when in full bloom. Grown also under much less favourable conditions on newly broken up poor soil, Serradilla proved superior to all other crops, such as lupins, rape, and buckwheat, grown beside it. Serradilla prefers limeless soils, and thrives in sandy soils. Its success in the Knysna is without doubt a most important matter, and one of the most promising features of the season's experiments. Its further progress deserves the most careful attention of all interested.

Winter Vetches sown in February and March came up well, and gave a good crop when mixed with barley on land treated with ash and guano. The crop may be considered quite successful.

Spring Vetches are similar, but the year's trials show that September sowings in this case did best.

Scotch Gore Vetches proved an even quicker growing variety than either the above, and did well when sown in December. All these three crops, on account of their heavy, rank foliage and natural inclination to seek to climb, do best when mixed with barley, which serves as a support, and prevents the lowermost portions turning yellow from lack of access to the light.

Red Clover (Trifolium pratense) did very well, growing to a height of two feet before flowering, and yielding a mass of succulent forage, and very suitable for making into hay. Great differences appeared according to time of sowing, April, May, June, August, and September giving the best results; the earlier sown beds grew slowly at first, but yielded a stronger and heavier crop than those sown in early summer. Later sowing came up badly, and the plants seemed weak, and burnt up. In view of the soil, most characteristic of Red Clover, these results are somewhat surprising, but so encouraging that the cultivation of this crop will certainly be continued and extended.

Alsyke Clover also did well, though not growing as luxuriantly as Red Clover. April and August sowings did best, and further experiment is justified.

Of *White Clover* the same may be said. This variety is naturally low growing, and well adapted for a mixture with grasses as permanent pasture. April, June, and August may be regarded as the best sowing seasons at Edinburgh.

Giant White Clover is merely a variety of the above, which it resembles in every respect, except that the plant is more robust, larger, and hence more desirable.

Crimson Clover differs from the above in being an annual. Sown in April, it made no growth until the warm weather came on, then did better than that not sown until August and September. Crimson Clover is essentially a summer growing crop, rising to a height of 2 feet, and giving a large crop of good, succulent fodder. It is a decided success, and particularly suitable on account of its rapid growth in the warm weather.

Egyptian Clover or Berseem is also an annual. Unlike the others, it did well only when sown in the winter. That sown in April stood 30 inches high in October, and proved an excellent crop, deserving of cultivation on a much wider scale next year. It is a very good forage crop indeed.

Japan Clover, Lespedeza, on the other hand, succeeded only when sown in the month of November. It grows close to the surface of the ground in a dense mat, quite different to the real clover, and must be sown on a larger scale before its full nature and uses can be properly demonstrated.

Spanish Sulla, tried like the rest throughout the year, did best when sown in October, November, and December, growing rapidly to a height of 2 feet 6 inches, and promising very well indeed.

African Sulla, a closely allied form, on the other hand, failed altogether.

Cowpeas.—A number of varieties of Cowpeas were sown, and all proved quite successful, giving a mass of leafage useful for feeding fresh or as hay. Sowings in December did best, and in future this season is to be recommended for sowings. The *Large Lady Cowpeas* did the best of any. *White Blackeye* was next. *Coffee* grew well, and gave much seed, though less foliage. The above varieties stood up to 2 feet high. *New Era* ranked next, and stood about 20 inches in height. *Gourd* grew to about 18 inches, and gave a very fair crop, though not equal to Large Lady or White Blackeye.

Tagasaste (Cytisus proliferus), the so-called tree lucerne from the Canary Islands, promises well. Several sowings failed, but from seed put in in November plants six months old are 5 to 6 feet high, and promising well, although injured by hares, which appear to relish it above most things. Further and more extended trials appear justified; for a fodder plant of this description would be a material gain to the district.

Peanuts (Arachis hypogaea).—Only two sowings of these have as yet been made, on the 14th September and 9th October respectively, and so far the results are not encouraging, only a few ripe fruits being found under each plant. Further trial is, however, desirable.

Lucerne.—Repeated efforts have been made to establish lucerne, but without success. The history is much the same in every instance. On different soils, well manured, and at various seasons, the seeds has been sown. Some has grown to a height of 9 inches, but eventually all has slowly died back, and about six months after sowing practically nothing remains. No other result could be looked for on soil so manifestly unsuited to lucerne. Yet in old gardens in the vicinity, well manured and carefully tended, lucerne grows well, and supplies several good cuttings a year. To do this, however, more attention is necessary than can be afforded on a field scale while ordinary land is far from being in that rich mellow state of the gardens in question, hence lucerne may well be written down as unfeasible as a commercial crop in the district.

Among those crops which indicate still an element of doubt but which none the less deserve further trial, may be mentioned:—Soy-beans, which it appears should be sown from October to December; Swazi Beans, to be sown in the heat of the summer; Lupins, blue, yellow and white, although the last named, generally regarded as less hardy than the others, did very much better than these.

To be recorded as failures after full and fair test and in comparison to the foregoing are the following: Velvet bean, Sainfoin, common and giant, African Sulla.

Millets and Sorghums.

The majority of these crops were sown in drills 3 feet apart, allowing of horse-hoeing, and also simultaneously, broadcast. The land was for the most part newly broken up poor humus sand, and was fertilised with 200 lbs. basic slag, 200 lbs. ash, and a top dressing of 100 lbs. guano per acre. It was impossible to foresee which of the varied allied forms would prove most suitable to the Knysna, but by repeated sowings (fortnightly from November till April and some in September and October) all were given an equal chance, and the outcome is gratifying, in that there is no shadow of doubt as to which varieties are going to do best. The inferior ones may at once be discarded. Only a few remain doubtful, and require further trial. Relatively thick sowing was practised throughout with the object of

securing a plentiful supply of farm food, which will always be the chief object here with crops of this class. Owing to the fact that many members of this family are of comparatively recent introduction, there is still a great confusion as regards nomenclature. European, American and Australian seedsmen have introduced the same variety under different aliases and, as the crops as a class readily adapt themselves to altered conditions, seed from these different sources show already slightly different characteristics, thus Japanese millet from Australia may shrewdly be suspected to be the same as Japan Barnyard millet from the United States, yet grown side by side, the former gave somewhat better results than the latter, and proved a more rapid grower. Similarly Boer Manna is said to be synonymous with Hungarian, Italian, Californian or Foxtail millet. In these reports, however, the name under which the seed was purchased has been rigidly adhered to.

Japanese Millet.—This proved to be the best of all the millets tried. Sown on the 4th November, it was two feet high within six weeks, and ran into flower two months after sowing. The best results were obtained from December sowings, and that sown in drills grew more quickly and was more healthy than that sown broadcast, yielded a softer and more easily eaten stalk. The crop yields a first cutting in two months from sowing. This plant is a favourite forage crop in Australia, and has done well in experimental plots all over the Colony and in the Transvaal.

Japan Barnyard Millet, brought from the United States of America and apparently the same as the above, was also next to it in growth and quality. November and December sowings did best, when sown broadcast gave a softer and more edible straw. In three months the crop grew to a height of 32 inches, and required a little longer than the last to mature. After being cut over, it sprouted up thickly again. No doubt on good soil very much better results would have been obtained. On very poor, new ground it made a fair start, but ultimately died off.

Pearl Millet came up well, but proved a slower grower than some of the others, attaining a height of 30 inches in three months, and then even not developing the bloom and maturing until about four months after sowing. It proved next to Japanese and Japan Barnyard in yield and merit and like them should be sown in December when it will supply green food in succession after these are past. In growth it approaches somewhat the Cane millets and to the Kaffir Manna grown in the North.

Hungarian Millet is somewhat different to those already mentioned in that it grew short, not over 15 inches, and seems more suited for grazing than for mowing. Also it did best sown in the months of April and September, and flowered when about two and a half months old. It did better broadcasted than in drills.

Egyptian Millet, sown both broadcast and in drills, came up well, proving the seed to be good, but only grew to a height of from 12 to 18 inches, and yielded but a light crop. It appeared to thrive better on old bush ground than on ordinary soil. It was tried fortnightly during the likely sowing season from November to April, and did relatively best in December, but cannot be recommended under such trying circumstances as those of the Knysna Experiment Station.

The same report holds good of *Siberian Millet*, except that it preferred the ordinary soil to old bush ground.

Cat-Tail Millet also did moderately well, and grew to a height of 30 inches, yielding a fair crop.

Kaffir Corn did poorly in comparison to its growth in good soil and its natural haunts. Sown in September it only attained a height of three feet when after five months' growth it came into flower. Compared to Japanese Millet it gave a very small crop, and was not as well relished by the stock. The plot sown broadcast did better than that sown in drills, the crop amounted to 3,025 lbs. per acre.

Planters' Friend, a highly spoken of Australian fodder plant, did well, attaining a height of 4 feet in some cases on a soil naturally very poor. This promises well, especially if sown in December.

Minnesota Amber Cane was very similar to the above, and may also be reported as deserving further attention on a field scale.

Amber Cane likewise, but in this case January sowings were the more successful.

Unendibule Amber Cane was decidedly inferior to the above three, slow growing and weak, even at the best, which was from January sowings.

Yellow Millo Maize proved a decided success even on very inferior ground. It grew strong and healthy to a height of 30 inches, and proved excellent feeding for all stock. The sowings of November and December gave the best results.

Nyouti is native to this country, being grown in Bechuanaland, and there occupying a place similar to Kaffir Corn. It cannot be said to have proved successful, yielding but a light crop. Stock only eat the leaves, refusing the stalk altogether. However, as the soil and climate of Knysna are altogether different to that of its natural habitat, this report must not be regarded as condemning the plant, which is certainly worthy of attention as an indigenous fodder crop, and deserves to be tried in inland parts.

Everlasting or Jerusalem Millet, Johnson grass, when sown in December, grew to a height of 12 to 15 inches, and did fairly well, but is to be regarded with suspicion, as in some countries it has developed into a pernicious weed.

White French Millet, Imphee Millet, Italian Millet, Early Orange Millet, Green Californian Millet, all did comparatively poorly.

Oil Crops.

Flax has also been regularly sown, and April demonstrated to be the best month to sow, while from September to November it failed altogether. Flax grew well throughout the winter, standing three feet high, and was reaped on the 15th November. It is somewhat liable to suffer from wind, but otherwise promises to do well. The trials will be continued.

Sunflower failed, except when sown in November and December, when it did moderately well, but not so as to mark it out especially.

Castor Oil deserves special effort to make it grow, in view of the considerable local demand that exists for it for lubricating purposes. A number of varieties were grown side by side to test their relative merits. Sown in March and September, October and November, all grew well, but the following notes are instructive:—

Ricinus Zanzibariensis grew tallest, attaining a height of 10 to 12 feet, with thick woody stems, but the seed, although plentiful, entirely failed to fill out, and were merely empty husks.

R. sanguius, a small but healthy plant, bearing a fair quantity of fruit. The seed has a reddish tinge.

R. major grew from 5 to 6 feet high, thin, and with little foliage, but a large quantity of ripe seed. These two sorts seem likely to succeed. The following all failed: *R. viridis, R. Gibsoni, R. Barbon-arborense, R. Africanus, R. minor.* Further experiments with promising sorts are in progress.

Sundry Crops.

Cotton of several different sorts, and planted at all times for over a year, has failed to give good results probably owing to the excessive moisture and lack of sufficient heat.

Birdseed must also be reported a complete failure so far.

Ramie.—In view of the great possibilities. this crop holds out, if it can be found to grow successfully, great care has been devoted to it. The seed was sown in beds as prepared for tobacco, on the 11th December, and came up on the 7th January, growing well till the 12th March, when they were transplanted into rows 2 feet wide and 1 foot apart. Here they progressed very slowly, and when reported on, on the 17th May, most had died. The progress of the remainder will be carefully watched and further efforts made to get it to grow.

Chicory shows some promise of proving suitable, although not yet completely satisfactory. Three sorts were tried sown fortnightly throughout the year. Two failed consistently, the Smooth Magdeburg and the Short Brunswick growing slowly and weakly, but the Witloef variety grew luxuriantly, and, indeed, became difficult to eradicate. In some countries chicory is recommended as part of a mixture for pasture, and possibly it may serve the purpose at Knysna. Sowings at any time have succeeded except those in November and February, perhaps owing to want of rain, but August sown plants did best of any. Large roots were not secured, the most being thin and branching, but probably these faults will be remedied and the tendency to branching reduced in future experiments. Without writing it down an established success, there is yet reason to regard chicory hopefully, and certainly deserving of further attention.

Miscus gras (*Alfilarilla*) is deservedly popular as a winter forage plant in the Western Province, especially in well tilled land, where it sows itself and comes up spontaneously, yielding in May, June, July and August abundance of valuable succulent fodder. Even in its natural haunts it is not sufficiently known and appreciated. Tried at Edinburgh, it grew but poorly, but justified further trial before being discarded.

KNYSNA ("EDINBURGH") EXPERIMENTS.—No. II.

MANURIAL EXPERIMENTS WITH RYE.

No extensive manurial experiments could be undertaken at Knysna in the winter of the season of 1906. The farm having only recently been occupied, the land was newly broken up, and although no heavy crop could be anticipated, it was intentionally sown without manure of any sort. In general a light crop result, and the difference in the natural fertility of various parts was clearly manifested. In certain parts, especially on the ground to which the following report refers, the crop was a complete failure.

The object in thus purposely failing to secure the best crops possible by the use of fertilisers was the desire to ascertain the natural variations in fertility from place to place in order that land as uniform as possible might be secured for the purposes of an extended series of experiments which will occupy several seasons to complete. This is in keeping with the objects of an experiment station as distinct from those of a model farm. Certain pieces of land, however, were available for manurial experiments, and the results obtained are published herewith. The aim of the following experiment was to ascertain the tendency of different manures and their action on the crop rather than to find out the best or the most economical fertiliser to apply. For this purpose, rye, the least exacting of the cereals, was used. The soil was a typical piece of raw sour veld, broken for the first time on the 18th of April and sown on the 22nd June on land which had only been harrowed after the roots and bush were gathered off. The crops were

reaped on the 19th December, and were all so light that in weighing grain and straw were taken together..

The following were the manures applied:—

Plot.	Fertiliser used.	Return in pounds per acre.
1	No Manure	No crop.
2	300 lbs. Lime	No crop.
3	150 lbs. Sulphate of Potash	7½
4	200 lbs. Nitrate of Soda	25
5	300 lbs. Basic Slag	110
6	300 lbs. Superphosphates	380
7	300 lbs. Dissolved Bones	515
8	300 lbs. High Grade Superphosphates	575
9	300 lbs. Government Guano	1,200
10	300 lbs. Complete Manure ... ... (160 lbs. Basic Slag, 100 lbs. Nitrate of Soda, 40 lbs. Sulphate of Potash.)	1,225

The size of each plot was one-fifth of an acre.

As was to be expected, the untreated control plot did very poorly, indeed there was nothing to reap from it. Plot No. 2 treated with lime also returned nothing whatever. Lime is necessary, but it is very slow acting, and to be effective in such a soil as that in question must be applied in much larger quantities and a considerable time before sowing. The soil is not alone deficient in lime, hence this addition of only one of the four essential plant foods is of no avail. For the same reason, potash added alone is of no effect, for even when a relatively heavy application of 150 lbs. per acre was given, the crop was a complete failure, only a few stalks appearing and the yield amounted only to 7½ pounds. Nitrate of Soda is at once available, and if the other plant foods are present in the soil, must give some result. The return of 25 lbs. per acre, though an advance on the others, is a proof of the deficiency of all the necessary constituents in anything like material quantity and in available form. Phosphates in different forms were next tried. Here at once a noticeable difference occurs, and although the return is a ridiculously poor one, yet the effect of phosphates relatively to that of lime, nitrogen, and potash is very striking and teaches its lesson. Basic Slag alone gave 110 pounds per acre of grain and straw, a miserable return, but a vast improvement over 7½ lbs. Basic Slag is slow acting, and contains considerable free lime. Superphosphate is more rapidly soluble and the return, still a very poor one, rose to 380 lbs. Using Dissolved Bones, which is a phosphatic manure, in soluble condition, this increase was raised to 515 pounds. A high grade superphosphate, by which is simply meant one containing more phosphoric acid than a low grade sample, gave a return of 575 pounds. In all these applications one ingredient was applied, though in the case of dissolved bones a little nitrogen accompanied the phosphate while all phosphatic manures also apply lime to the crop. These applications are to be regarded, however, as onesided and incomplete. When all the plant nutrients were supplied together, although only in small quantities, the whole weight of the mixture being the same as that of the phosphate alone, a very different result is obtained. On the land the differences were most remarkable. On the above described plots a few struggling plants could here and there be seen, in some cases they had to be sought for. Alongside these, surrounded by such plots, in fact, were two plots with a fair crop, healthy and of good colour, standing with level tops fully four feet high. The heads were, it is true, light, and the crops not actually a heavy one, but compared to the others the difference was as-

tonishing. A moderate dressing of 300 lbs. per acre of Government guano had been applied to one plot, and the resulting yield was 1,200 lbs. Guano contains all the necessary plant foods, nitrogen in preponderating amount, and at once the effect is apparent. Another complete fertiliser, consisting of 160 lbs. of basic slag, 100 lbs. of nitrate of soda, and 40 lbs. of sulphate of potash, confirms in a striking manner this result, the crop cut amounting to 1,225 pounds per acre.

It would be rash to attempt hasty inference from such tentative experiments as to the profit to be derived or the proper fertiliser to use. The crop was reaped within eight months of the soil being broken for the first time. There was no time for the ground to become mellow and, as is well known, sour veld slowly improves under cultivation and successive crops. The experiment was not therefore carried out under normal farming conditions in which less marked differences would have been visible. None the less it is very instructive, and has proved a useful preliminary step in framing a series of manurial experiments which are now in progress. The failure of lime confirmed by that of basic slag, to exercise immediate influence on a soil entirely deficient in lime and poor in phosphates, is remarkable, and must be attributed to the raw state of the ground in which slow acting manures are at a disadvantage. The action of superphosphates bears this conclusion out. The guano, an organic manure, should prove so effective on a soil naturally over supplied with humus, seems at first sight rather anomalous. This may be accounted for by the fact that guano contains a large quantity of nitrogen in various forms more or less readily available which come into use as the plant requires it, and being accompanied by fair amounts of the other necessary plant foods, result in a crop being grown on soil which itself cannot yield anything in its present crude condition. The application of all the necessary plant foods in inorganic form produces a crop a trifle better than the last. The return of 1,225 pounds per acre must be attributed wholly to the combination used. The soil itself produces nothing. Alone each of the ingredients even in excess have no effect. Combined, their value is at once manifest. It would not be practicable to grow crops on a soil which itself yields nothing and to have to look to fertilisers entirely for the yield. This has been the case in these experiments, yet another year the land may reasonably be expected to be in a condition to produce a crop, and fertilisers will only supplement this natural fertility which is their proper function. So far as the lessons of this experiment may be applied to practice, they indicate the need of complete fertilisers as against single salts, the superiority, at least, in immediate results of quick acting superphosphates or dissolved bones over basic slag, and the value of guano.

KNYSNA ("EDINBURGH") EXPERIMENTS.—No. III.

VARIETIES OF WHEAT.

Wheat always was and probably will remain a favourite crop even in districts to which it is not well suited, for the farmer has a strong though misdirected ambition to grow his own bread. Often it would pay him better to grow other more appropriate crops and buy his meal from districts where wheat can be grown to advantage. Still, since even in the coastal sour veld they will grow wheat, it is as well that the most rust-resistant and otherwise suitable sorts be grown. At Edinburgh there is really no suit-

able soil for this crop, but as it was thought desirable to compare together a number of different kinds, especially to ascertain the relative rust-resistance, a piece of sandy soil, formerly used as a garden, was set aside and a few pounds of sixteen different varieties sown on the same day under identical conditions. Great differences were noticeable during growth, and in the final results, though, as was anticipated, none did remarkably well. The old land was full of steenbok zuring (*Rumex acetosella*), while the wet weather of September and October favoured the rust fungus. Everything, therefore, was against the wheat. All were attacked by rust, but the difference in the power of resisting the disease was very marked.

Van Niekerk's wheat here as elsewhere proved itself by far the quickest grower in early youth, but later on suffered considerably from rust.

Darling wheat was also very early and suffered but little from rust, finally coming out relatively well.

Budd's Early did even better as regards yield, was attacked by rust, which, however, did not seem violent enough to injure the grain.

Jonathan showed little sign of rust, but proved a very light crop, and was evidently in uncongenial surroundings.

Gluyas Early began well, but was also affected by rust.

French wheat, an old Colonial variety grown further to the east along the coast in Alexandria and Bathurst, proved the best of any, slow of growth at first, but doing well later on, and finally producing large, healthy strong ears and only very slightly attacked by rust when quite young still.

Kaalkop wheat was second best, growing much faster than most, and recovered from the rust and yielded a moderate return.

Of the others none did well, White Early wheat from district proving the worst. The others tried were Golden Ball, Blue, Spring, Elephant, Italian, Dumbletons, Rietti and du Plessis.

KNYSNA ("EDINBURGH") EXPERIMENTS.—No. IV.

VARIETIES OF OATS.

The oat is in most countries considered a grain crop, and as such, fed to horses or ground into oatmeal. Here it is valued only as a forage and oat-hay; thus an article scarcely known in Europe is a staple product with us. Eminently suitable as oats are for this purpose, the question arises whether the imports of oats, amounting at present to 4,938,635 lbs., valued at £13,614, and oatmeal, 4,040,930 lbs., valued at £23,251, during 1906, cannot be replaced, in part at least, by locally grown grain. The Algerian oat can be used for this purpose, although less suited therefor than the thin-skinned plumper sorts known as potato oats and Tartarian oats. Last season a number of sorts belonging to these types were tried alongside Colonial grown Algerian oats. The following were the names of the oats grown: Dun, Black Tartarian, White Tartarian, Sparrow bill, Canadian, Danish and Norwegian. The seed was sown on the 13th June. On the 26th September rust began to make its appearance. Warm but continuously wet weather followed, and a month later the crops were evidently seriously injured by rust. By the 5th November the crop was totally ruined by rust, and all were alike attacked, except the Algerian oats, which, though slightly infected, remained healthy and vigorous. The different sorts withstood the rust in varying degrees, but ultimately all alike were destroyed.

This experiment was repeated by Mr. Viljoen on the farm of Dr. Beck, at De Oude Drostdy, Tulbagh, in a superior grain district. Here these

varieties suffered severely from summer drought, but benefited very much from a casual little rain, and though by no means so good as Algerian oats alongside, yet gave promising results.

The same sorts are also reported upon from Robertson.

KNYSNA ("EDINBURGH") EXPERIMENTS.—No. V.

SWEET POTATOES.

Sweet Potatoes are one of our main crops all along our southern coast, and their culture is well understood. Literally any quantity could be grown if an outlet existed for the roots as such, or for products derived therefrom.

Limited experiments were conducted in these directions last season, but it is hoped that it will be possible to extend these next season.

A comparison was made between planting the tuberous roots and the sets or ranks. While the former, whether whole or cut, required a large quantity to plant even a small area, and was in this respect dearer than planting ranks, yet it not only gave a heavier return but also a very much finer quality of sweet potato, round, plump, and smooth, as compared to the thin long roots obtained from the ranks.

Manurial and cultivation experiments were attempted, but the raw land available proved too uneven for the results obtained to be regarded as reliable.

RESTORATION OF THE VELD BY THE AID OF ALOES.

By Eric A. Nobbs, Ph.D., B.Sc., Agricultural Assistant.

The deterioration of the veld and terrible injury to the surface of the ground caused by erosion is a general complaint voiced at all farmers' gatherings and in current agricultural literature. The fault of the present sad state of affairs is mainly attributed to carelessness and over-stocking in the past, and it is additional cause of regret that the trouble might have been materially diminished, if not entirely averted, instead of which we find that in the present day the process is being continued and even accelerated. Instances of attempted reclamation are still relatively few. Striking examples where this great drawback has been successfully tackled do however exist, and numerous methods of treatment have been devised, and are now successfully carried out. For such an evil there can be no single cure. Generally speaking, fencing, resting of the veld, and the construction of dams are the three chief modes of reclaiming the veld. It is here desired to call attention to the process of restoring veld with the help of the common American aloe. This is only one of many means, and is perhaps not everywhere applicable, yet it certainly deserves much wider attention than it has up till now received, although striking examples of its success will be found on the farms of Mr. Richard Rubidge, at Wellwood, situated in high-lying gebroken veld in the district of Graaff-Reinet, with an average annual rainfall of eighteen inches, and on that of Mr. Philip Weyer at Darlington, in the noorsedoorn country of Somerset East, with only five inches of average rainfall. The greatest credit is due to these gentlemen for their pioneering efforts, and it is from hints furnished by them that the following notes have been prepared.

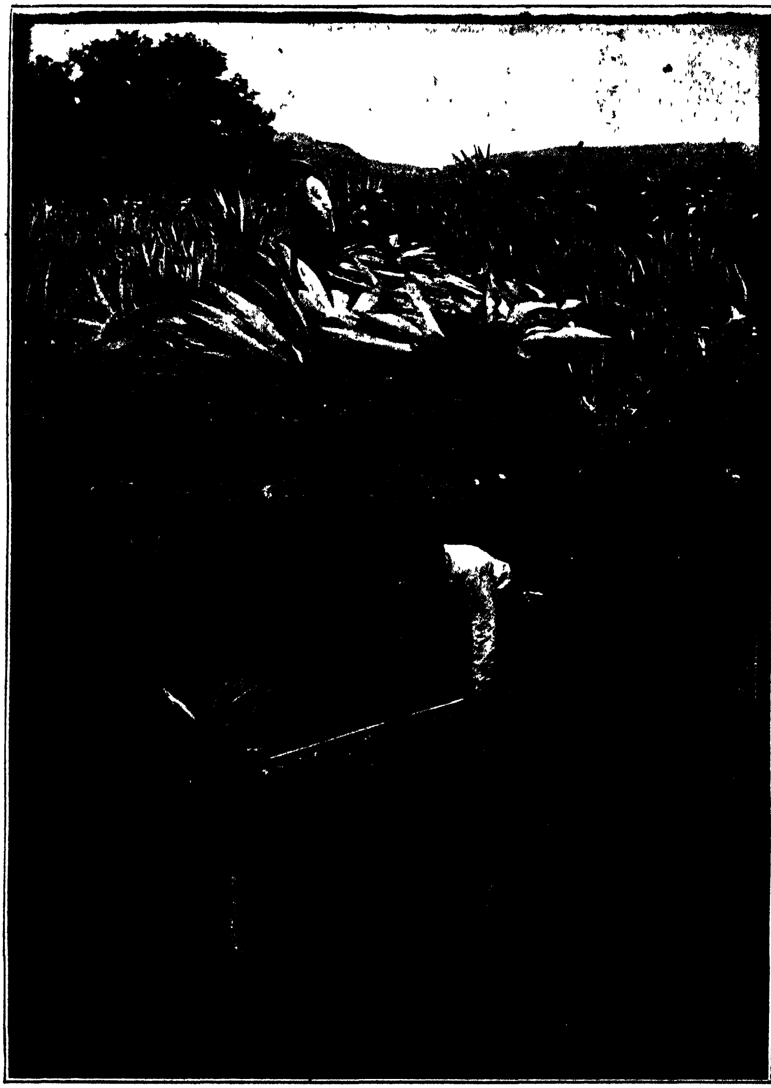
The aloe is put to three separate uses. In the first case a line of aloes is planted a short distance above the head or commencement of the sluit with the object of diverting the water from the point of maximum damage, that is to say, the place where water running over the surface falls over the steep edge of broken ground, gradually eating its way further and further back. This row of aloes must be long enough to divert the water completely from its old course. If only 10 or 12 yards long, storm water running over the surface is apt to scour round the two ends and get back into the head of the donga. This work should be accompanied by the planting of willows or the formation of small dams in the bed of the sluit, and the reduction of the vertical earth banks to their natural angle of repose, that is to say, to the slope at which the surface ceases to break away, and, being permanent, allows vegetation to spring up. The flow of water being rendered less violent, sluits so treated may be expected gradually to silt up, especially if seed is sown on the raw earth surfaces.

At De Toekomst Mr. Weyer has utilised this plant by putting in long rows of it across the hollows and as life extensions from the wings of shal-

Restoration of the Veld by the Aid of Aloes.

1.—Aloes being planted in a line above a water course. Old hedges in the middle distance. 2.—Aloe hedge stopping flow from the mountains. Note the trees springing up under its protection. 3.—Aloe hedge catching silt from upper slopes. Both figures are standing on the level ground. Note the resulting terrace.

RESTORATION OF VELD BY AID OF ALOES.



1.—Aloe Nursing at Wellwood. Uprooted plants may lie a year without hurt before planting.

2.—The simple process of uprooting. The spade is quite ineffective.

low dams, with a view to facilitating the collection and storage of water and preventing erosion in time of floods. But these are not the chief uses of aloes.

Erosion is mainly due, beyond the predisposing causes, such as tramping out of veld or excessive burning, to the torrents caused by sudden storms, which gather strength from every runnel and depression, and speedily exert sufficient force to carry away great quantities of the best of the surface soil. The underlying principle of the method now to be described is that of checking the velocity and preventing the accumulation of such bodies of water, except where they can be controlled. The intention is twofold—the cure and prevention of sluits and the improvement of the whole veld. These aims have been abundantly achieved, and the success is as great as the process is simple.

The procedure is somewhat as follows:—

It is first necessary to ascertain where water during storms tends to collect, and to do mischief either by the actual formation of sluits or by washing away the best of the soil, and leaving in its place bare stretches of hard-caked, unproductive earth. Once the herbage is destroyed the process goes on very rapidly, and all the natural influences of heat, drought and wind, frost or flood, combine to cause further injury. On such places, and they are common enough in the Colony, aloes are planted in single straight lines approximating to the contour of the country, that is to say, taken about horizontally and at right angles to the general fall of the land. The line of succulent, big-leaved aloes soon begins to exert an influence, checking the flow and so catching the sediment, which forms into a long bank, and as it rises throws back the water and, helped by every succeeding flood, gradually covers the wasted surface with a level deposit of fine silt, which, but for the aloes, would have been well on its way to the Agulhas Bank.

The stretch above the aloe line is a dead level, but as the deposition is slow the bush continues to grow on it all the time. Not only so, but by virtue of the rich earth brought down and the occasional flooding, the bush and grass grow with especial luxuriance, soon covering the ground, and so assisting the process of regeneration.

A level terrace is thus thrown back for a considerable distance, depending upon the slope of the ground, but frequently extending to over a hundred yards. The improvement of the veld, however, extends much further back, for underground the water is also held up and the loss by drainage averted. In practice the effects are far more striking than might be expected. Stretches of excellent veld now stand where previously there was nothing but bare earth. The benefits of prevention of further injury, though not capable of measurement, must also not be lost sight of.

While this improvement goes on above the aloe hedge the veld below benefits also in that the sluits are stopped and further erosion prevented. To appreciate to the full the benefit to the land it must be seen and compared with adjacent unprotected veld. The result is truly astonishing. The process being one of growth and accretion, it is necessarily slow and gradual, especially at the outset, but at Wellwood may be seen terraces raised about six feet by means of aloe hedges in the course of less than thirty years, while on the flat above all traces of sluits have long since been obliterated.

The difference of height is clearly shown in the illustration, where the two figures are standing on the level ground above and below the hedge. As time goes on the hedge thickens up, some lengths so close as to be regarded as jackal proof, small stock being grazed day and night within the enclosures with impunity. Where an aloe shoots into flower and dies, causing a blank, there are scores of plants available close by to fill its place. Lines of all ages are to be seen at Wellwood. Originally the plants were put in 4 feet apart, but now to accelerate the process 3 feet is the usual dis-

tance. A single line is sufficient, and it is advisable to put in plants as big as convenient, weighing, say, up to 50 pounds. Originally a nursery of single plants put in furrows about 15 yards apart was instituted. The aloes have, however, now spread nearly across the intervening space, as shown in the illustrations, in spite of being constantly taken up for planting new lines.

When required, plants are lifted, as depicted, by means of a heavy crowbar. It does no harm to their vitality, while considerably reducing their weight by evaporation and loss of adherent earth if the grubbed-up aloes are left for a year or so before being finally planted. But the miles of hedges now themselves serve as nurseries for any quantity of fresh material.

It is an astonishing feature how mimosa, karee, and willow trees spring up in the protection of the aloe hedge, a feature well brought out in the accompanying photographs.

To plant a line of aloes a couple of furrows are thrown out with any strong plough, and the aloes put in 3 or 4 feet apart, as the case may be. The work proceeds rapidly, and may be carried on at any season and at odd times whenever convenient.

An incidental, but very material gain is the abundant supply of succulent and palatable food for time of drought provided by the fleshly leaves of the aloes. They are frequently grown in small camps for this purpose alone, but there is no reason why they should not serve triple purposes of fence, famine food, and veld preserver at one and the same time.

A special application of this principle is shown in the last illustration, which shows a wide canal carried along the face of a gently sloping plain near the foot of a range of hills. From the kloofs and slopes above the storm water is caught and brought along the canal, falling from six to twelve inches in a hundred yards for a distance of several miles to dams conveniently located for irrigating lucerne lands.

Silt is a serious hindrance to this scheme, but this trouble has been entirely overcome by planting a line of aloes parallel to the canal and some few yards above it, as represented. The picture shows a recent extension, and the aloes are lying in a line awaiting planting

Such is the very simple process which may readily and advantageously be imitated by many a Karoo farmer. The actual plan of operations will differ from place to place, but there can be no doubt that the principle may be applied with great advantage on a large number of farms where it has not yet been tried.

STOCK AND IRRIGATION FARMING.

(FARM WITHOUT IRRIGATION RUN IN CONJUNCTION WITH SMALL IRRIGATION HOLDING.)

By FREDERICK FRANK, of Bayville.

With few exceptions, these two classes of farming are run separately; and the immense advantage of farming them together does not seem to be generally recognised by those living on farms without irrigation.

In this, the Eastern Province, a very small number of stock can be safely grazed per morgen, owing to the periodical droughts; but with a small irrigation holding run in connection with the dry farm, the latter can be fully stocked, as in good seasons; and, what is more important, first-class stock can be farmed, as there is so much less risk of losing them. With the dry farm alone medium cattle and birds, perhaps, pay best, as during a drought there are sure to be losses, and such losses are not so heavy in number and value.

Ten morgen under irrigation should be sufficient to supply a thousand morgen dry farm with feeding stuff during the most severe drought; and in ordinary seasons such irrigation land would produce much more than was absolutely necessary for feeding at the dry farm; but extra feeding during the winter months to milk cows at grower's cost would give an excellent return.

It is, of course, necessary that these farms should be reasonably near the rail, or near one another by road; in the latter case, not more than twenty miles apart.

Taking the irrigation land on the banks of the Great Fish and Sunday's Rivers as an example, an idea can be formed of the large area that it is possible to safeguard against drought, and that upon which high-class stock can be safely farmed. Add to this the probable possibility of leading out flood water in high level gravitation canals, watering suitable land many miles from the river, and so supplying another block of a twenty mile radius surrounding this irrigated land, and we have a large extent of country through which these rivers run, producing at least double the return it now produces; closer settlement will follow, and greater trade for the towns.

THE MANAGEMENT OF THESE FARMS IN CONJUNCTION.

With a year's food in reserve and sufficient water for stock, there seems little to trouble about on the dry farm; but to make a success and not a nuisance of artificial feeding, great care must be taken in the method of feeding. On the irrigation holding the question to be considered is what will be the best crops to grow for the stock.

The Irrigation Holding.

About two-thirds of the land under irrigation should be laid down in lucerne, the remaining third can be used for growing crops for grain, and when sufficient food is stored at the dry farm, crops suitable for market can be grown. The principal object is to supply the dry farm.

The only stock kept at the irrigation holding should be the necessary working animals, two horses or four oxen, and ostrich chicks, until they are from three to four months old.

From the first of October to the end of March can be taken as the lucerne season. Every year from the beginning of the season sufficient lucerne hay must be sent to the farm for the year of possible drought; in the beginning of the next lucerne season, when the lucerne is watered, and therefore safe for one crop, the surplus at the farm, equal to amount of such crop, should be sold before the new hay comes in. This is to obtain a good price and to replace old hay with new, as new hay is better for birds, milk cows, and calves when running in dry veld.

The Dry Farm.

There are generally some lands on every dry farm; the crops to grow on such lands should be those which are difficult to ride, crops for green feeding, mealies, barley, and lucerne; and they should be fed green, unless the veld is exceptionally good.

Method of Artificial Feeding.

The three to four months old chicks, sent from the irrigated land to the dry farm, should be kraaled at night until six months old, herded in the daytime, and fed morning and evening with chaffed, wet lucerne hay and a few mealies; as they get used to the veld, in the morning only will be sufficient. One bag of chaff to ten or twenty chicks, according to the state of the veld. If they do not finish their food, give less, as they are better without the food when dry, if the veld is dry, as dry food at such a time is likely to cause constipation. This also applies to "plucking birds."

As breeding birds of good quality are generally camped off in the best veld and in large camps, little feeding is necessary. Two to four pounds of grain per pair a day is sufficient.

When the chicks come out they should be allowed to run with the old birds for a week, and then sent to the irrigation farm until three or four months old. If chicks are allowed to run in the land at the farm until four months old they will for a long time trouble to get back to the land.

In feeding plucking birds the greatest care must be taken. The writer, after trying many different methods, has found the following the best. Every hundred birds should be herded or continually looked after by one native, whose duty is to go round the fences every morning driving the birds toward the centre or spot where you are feeding that day.

In the evening damp on the outside as many bales of lucerne hay as you require for one day's feeding. This is only to make it easier to cut; if not damped, it will be brittle, and possibly ruin the knives of the chaff-cutter.

The next morning cut these bales up with the chaff-cutter, and sprinkle the heaps of chaff with water, about two buckets to a bale, turning it over with a fork, so that all is equally wet. Then, at once, ride to the camp in which the birds are, ride into the veld some way from the gate and fences, throw out thinly as the cart goes, and

when finished turn round and go straight out of the camp. In this way the birds will be all feeding when the cart goes out of the camp, will be away from the fences, and when they have finished will go off in all directions feeding in the veld. The cart should be driven in a different direction as often as possible.

If birds are allowed in the land, fed near the house, near a gate or a fence, they will walk up and down the fences near those places and starve until fed again; also, if they are allowed to follow the cart to their gate, they will hang about near the gate.

As to the quantity to give, this depends on the state of the veld. When necessary to feed, start with one bale to fifty birds, and increase or decrease according to whether they finish it or not.

To feed one hundred birds and herd them, one native, one youngster, a pair of oxen, cart, and chaff-cutter are necessary; the man and boy cut up the food, then the man collects his birds; the boy wets the chaff, loads it, and takes it to the veld; the two feeding the birds, and the boy returns with the cart.

Cattle should be fed much in the same way as explained for birds, except that when fed only on hay it need not be cut up, and it should be slightly damp, not wet. If green lucerne is fed, hay and lucerne should be chaffed, mixed half and half, and given fresh. There is always danger in feeding green lucerne alone.

Cattle will more contentedly graze in the veld if fed in the veld, and not at the homestead.

The summer will be the busy time at the irrigation holding and the winter at the dry farm, therefore extra labour or working animals are seldom required.

Green Food.

When the two farms are within ten miles of one another it is quite possible to ride green food to the dry farm twice a week and feed green stuff every day. Lucerne is the most difficult to keep nice and sweet. All green stuff should, on arrival, be at once off-loaded and spread out in the open.

It is very difficult to purchase a 3,000 morgen farm with 30 morgen laid down in lucerne under irrigation. But it is comparatively easy to purchase a dry farm of about 3,000 morgen, and an irrigation holding of 30 morgen within reasonable distance. The cost of the two separately would be very much less, far less than is proportionate with the extra cost in transport and management.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during September, 1907.

Port of Shipment.	Destination	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	German South West Africa.	63	Apples ...	10,740	36 10 0
" ...	"	96	Oranges ...	17,500	50 6 0
" ...	"	14	Bananas ...	10,100	13 0 0
" ...	"	1	Lemons ...	200	0 10 0
" ...	"	4	Naartjes ...	1,180	1 17 0
" ...	"	8	Pineapples ...	591	4 10 0
" ...	Zanzibar	30	Apples ...	2,100	12 0 0
" ...	"	10	Pears ...	600	3 0 0
" ...	Portuguese East Africa.	95	Apples ...	6,300	36 0 0
" ...	"	35	Pears ...	2,100	12 0 0
" ...	"	5	Oranges ...	300	1 10 0
" ...	German South West Africa.	28	Pears ...	1,810	8 5 0
Port Elizabeth	England	1	Oranges ...	200	1 0 0
East London...	"	1	" ...	...	0 7 6

MILK RECORD.

[ELSENBURG COLLEGE HERD.]

Subjoined is the Milk Record to 31st October :—

Breed and Cow.	Days in Milk.	Yield in Lbs.		
		During October.	Total to date.	Daily Average.
FRIESLANDS.				
Romula	262	947	8341·5	31·8
Victoria	251	908	6879·5	27·4
Violet	134	937·5	4325	32·2
Bell	92	1015	2917	31·7
Rose	66	1366	2875	43·5
JERSEYS.				
Gladys	147	970·5	4971·5	33·8
Gertie	137	909	4355	31·7
Fuschia...	73	766·5	1814	24·8
Grace	73	695·5	1575·5	21·4
Gwendolen	57	1016	1742·5	30·5
Gilliflower	61	1169	2158·5	35·3
AYRSHIRES.				
Cherry	193	309	3575·5	18·5
Queen Dot	142	527	3541	24·9
Lobelia	90	715	2515	27·9
CROSS.				
Disa	211	522·5	4414·5	20·9

The average for 15 cows works out at 27·9 lbs. or over 16 bottles per day.

WOUNDS: THEIR TREATMENT AND SOME MINOR SURGICAL OPERATIONS.

[By W. ROBERTSON, M.R.C.V.S., F.R.S.E., Director of the Veterinary Laboratory, Grahamstown.]

It is not my intention in this short article to give more than the information necessary for the empirical treatment of the wounds so frequently sustained by farm stock, and a few hints as to the most successful and simple manner in which to perform certain small operations which the owner of stock should be able to carry out.

Before dealing with wounds and their treatment, it will be as well to draw attention to the various methods and means of restraint employed when operating on the domestic animals. It can be taken as an axiom that no man can do justice to himself and the animal he is operating on unless he has that animal completely under restraint, and is free from all apprehension as to what will happen to himself or his patient should the latter struggle badly. The simplest form of restraint, taking the horse first, is the nose twitch. (Fig. 1.) This is a loop of cord passed through a hole in a straight wooden pole and used to compress the upper lip or ear, the twitch should be used with discretion and care, as if carelessly used it is capable of inflicting the most acute pain upon the patient, and further, in a short time rendering the upper lip insensible, and thus defeating its object. A twitch should never be placed on the lower jaw, but may sometimes be employed on the ear where an animal refuses to allow that instrument to be applied to the upper lip. Often a horse will persistently run back and frequently rear if hard held by the halter; in such a case a so-called Polish Gag can be employed. This is simply a length of hard cord or sash line having a loop at one end, the looped end is passed round the horse's head through the mouth, and meets the free end, which is then threaded through the loop; traction on this will cause the cord to exercise pressure on the edges of the mouth, and effectually prevent rearing or running back. (Fig 2.) It is a good plan to blindfold a horse if inclined to be vicious; this blindfolding seems to mystify the animal and render him much quieter. For the purpose a towel tucked under the cheek pieces of the bridle is excellent. (Fig. 3.)

Picking up the fore foot and fastening in that position with a stirrup leather, is useful as one means of restraint. Always take a turn of the leather round the foot before buckling the same to the fore arm. (Fig. 4 and 5.) Figure 6 shews a means of restraint used by Argentine horsemen.

It is a modification of the French Hippo Lasso; the photo clearly shews the means of applying the rope. I have used it with much satisfaction

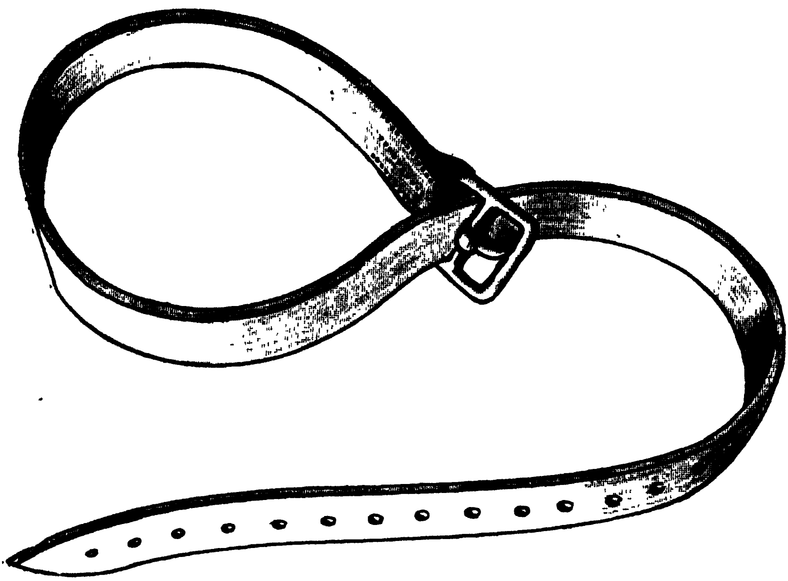
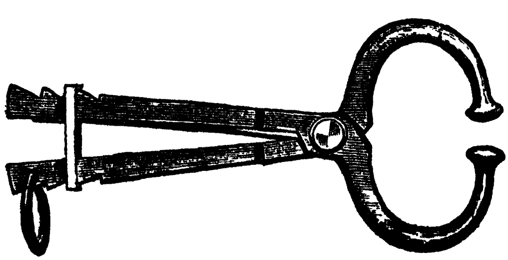


FIG. 4. -Stirrup Leather showing method of buckling for holding up horse's leg.

when dressing say a fore foot or attending to saddle falls. The rope can be drawn so tight as almost to cast the animal. In the case of a cow, we have a choice of simple means of restraint. The Bull-dogs (Fig. 7) are much used in Europe, and in many parts most popular, but it is generally advisable to cast an ox (see article on Castration) even in cases of slight operation. One method of examining a hind foot I have not generally met with in this country consists of two men passing a broom-handle in front of the bend of the hock and lifting upwards; by this means the hind foot can be examined. (Fig. 8.) These are all simple forms of restraint, and useful if the operation required to be carried out is simple, but in many cases it is necessary to have the horse under further restraint before we attend to any serious injury or attempt any serious operation. Horses are cast in a number of ways, and legions of patent appliances for the facilitation of that work have been brought before the public. The simplest method is by the use of the rope (see article on "Castration of the Horse," *Agricultural Journal*, September, 1905). That is the easiest and most general method adopted in this country, and if properly carried out with the patient in a fit condition (not distended with food and water) is generally attended with no risk whatever. The employment of leather hobbles, etc., is generally out of the question with a stock owner.



Bull holder with slide rack and spring.

Firstly see that the rope or reims are sound, secondly that you have enough men to pull the animal down quickly, and thirdly see that the animal to be cast has had neither food nor water for at least twelve hours previously. The accident most dreaded in casting animals, particularly the horse, is a broken back due to the struggles of the animal causing the powerful back muscles to literally tear the backbone in pieces. The best way to avoid this is to have a good man at the horse's head who, whenever the horse falls will endeavour to extend the animal's head in a straight line with the body and prevent the horse from bending his neck and bringing the chin into the chest, and so allow him to get his back muscles on the stretch. If a horse when cast for say castration is old, and struggles much, a good plan is to take a flat reim, make it fast to one hind leg midway between hock and fetlock, bring the free end round the body under the back, and fasten it similarly to the other leg. The animal when he struggles will struggle against the reim, and save his back.

It is incumbent upon every owner of valuable stock I take it to have a supply of simple medicine at hand to treat ailments as they arise, and I think it is equally his duty to have at hand one or two simple instruments kept in a clean and efficient condition. A knife used for no other purpose, a pair of scissors, a pair of forceps or tweezers, a few needles and sewing silk, a couple of teat tubes, some disinfectant fluid and some iodoform and boracic acid. A very neat serviceable and cheap case is procurable at Messrs. Mayer, Meltzer & Co., Burg Street, Cape Town, which contains all the instruments necessary for performing most of the operations a stock farmer is called upon to do; the name is the Hobday case, and it costs about £1. All the instruments I have detailed can be obtained for 10s. If an ordinary pocket knife is used, let it, prior to use, be well washed in Dip and hot water. I have in my mind a mysterious outbreak of anthrax or miltziekte traceable to a knife used to castrate calves, and which had some two weeks before assisted at a *post-mortem* on a miltziekte bullock. In regard to casting ropes, I find that fifty feet of ¾-inch rope which has been in a tan pit for a week, far superior to reims; it is soft, pliable, and ties easily.

In regard to wounds these are generally grouped under three heads, according to their character, and designated as:—

1. Clean cut or incised wounds.
2. Pointed or deep-punctured wounds.
3. Torn or lacerated wounds.
4. Poisoned wounds, in which we include snake bites.

An Incised Wound.

is one which, as its name indicates, is simply a clean cut and varies from simple divison of the skin to a severe section of the deep structures. Treatment in such a case depends to a great extent upon the severity of the injury, a small cut frequently requires little or no attention save keeping the place clean, but I would strongly advise all owners, at least those possessing, say, valuable horses, to stitch up all clean cuts as, in fact, the great majority of wounds, by the aid of stitches, the edges are brought together and the ugly scar frequently seen on chest and legs, as the result of collision with the barbed wire or the lost hide, will be to a great measure avoided. Take an example as an instance of treatment, the horse has run into wire, and there are two big wounds on chest. First, and this is the most important step in the treatment of all wounds, ascertain by exploration with the finger that there are no foreign bodies in the cut, no pieces of gravel, splinter of sneeze-wood or piece of forage. Take a dish of water (warm) and to every

two quarts add a teaspoonful of Jeye's Fluid, Little's Dip or any other of the coal-tar fluids and with a clean soft rag thoroughly clean the injured part; allow the disinfectant to trickle through the wound and thus by thorough cleansing ascertain the extent of the injury. If the wound is severe the bleeding points of an artery or vein may be seen; if such a thing as a pair of tweezers is available the bleeding point must be secured and tied with a piece of thread and a half-hitch, if no tweezers is at hand try to get a threaded needle around the bleeding point and secure that way. If this proves a failure and the bleeding is severe and the wound deep, plug it with clean cotton-wool, clean rags —wrung out of the disinfectant—or even a handkerchief or a sock similarly treated, then draw together the edges of the wound and fasten with a few stitches. This plug can be removed when the bleeding ceases, say in 24 hours. If the wound is on an extreme position, as the legs, a bandage above the wound will arrest bleeding. In bringing together the sides of a clean cut wound always when possible clip away the hair from the edges, as the presence of hair will act as a foreign body and prevent true and early union. In regard to the methods employed to bring into apposition and hold there the edges of a wound we can employ clean fine silk, fine twine or catgut, all previously soaked in the disinfectant. The needle employed is half-curved, and the stitches are each tied up separately with a surgeon's knot, *i.e.*, one which will not slip. If sewing suture material is not to hand pins can be employed. The edges of the wound are brought into apposition by the pin being run through both edges and a piece of fine thread twisted round the pin in a figure of 8 twist. It is always advisable to allow a small space to remain unfastened at the lower end of a cut; this acts as a drain for the blood and waste matter which will form during the process of healing and which if left and imprisoned in the cut might form matter or pus and produce an abscess. As regards after treatment of a clean cut, bathe every morning with warm water and a little dip, if the wound is deep see that the scab does not block up the drainage aperture and dust the part with a powder—Iodoform one part, Boracic Acid five parts, and in about seven to ten days remove the stitches.

Punctured Wounds.

Here we have such a wound as might be produced by the sickle left in the stall or by the horse running away and striking a disselboom or iron fence-pole. Here one must rapidly ascertain the extent of the damage by exploration with the finger and a piece of clean fence wire. If the wound runs along the skin, or under the surface muscles in a downward direction, the best thing to do is to make the wound open at both ends by making an incision at its lower end, otherwise all the pus and matter from the wound will run down into the pocket and an abscess will assuredly result. It may be necessary to stitch up the upper end of the wound. After treatment consists in occasional spraying out with weak disinfectant, using Higginson's enema. While mentioning weak disinfectants, clean, fresh healthy wounds are frequently retarded in the healing process by the use of too strong solution of disinfectant; a clean round wound wants little of the latter, and it should be borne in mind that what kills organism retards growth and union of healthy tissue.

One of the commonest seats of puncture wounds in the domestic animal is the foot of the horse and the cause gathered nails, bones, or other pointed articles, not excepting the farrier when he drives a nail too close. It often happens that a horse is noticed lame and on inspection a nail is found stuck in some part of the horse's sole. After removal the horse goes off sound but becomes lame in a few days. This is due to the pus which is

forming in the nail prick having no outlet, and as the horse's foot is a horny unyielding box, causing excessive pain. The shoe must be at once removed and search made for the nail prick which must be opened up to allow a free exit for the pus and a bran poultice applied hot. This will soothe the pain and soften the foot for further examination. It is always a good thing to trace a nail prick to its finish even when the extraction of the article seems to afford relief. If attention is not given to a suppurating nail prick the pus gathers in amount and extends in the path of the least resistence, viz., between the sensitive and insensitive parts of the foot and emerges at the coronet as a boil or abscess, then constituting what is termed a Quittor, a most difficult case to attend to. If such a thing occurs the only thing to be done is to open up the nail prick in the sole of the foot and poultice well, then spray out the hole at the coronet with a solution of Bluestone 1 drachm to the ounce. If this does not improve matters strengthen the solution, and after a time try Sulphate of Zinc 20 grains to the ounce; but if a Quittor is really well established the services of a Veterinary Surgeon should be sought to perform what is generally a serious operation, viz., the cure of Quittor, cutting down on the sinus or passage. Another punctured wound which gives rise to much worry is that where an injury over a joint has caused an opening into the joint cavity. These wounds are always serious, and often result in permanent stiffening of the joint and death from blood poison or pain and exhaustion. The joints mostly punctured are the hock, fetlock and knee, and a common cause is a cast shoe lying with the nail uppermost in a horse's stall. At first not much is noticed, and lameness may be very slight, but soon the joint is noticed to be hot, painful, and from the tiny wound there is constantly discharging a thin yellowish fluid (joint oil which coagulates around the orifice). Treatment of such wounds are most unsatisfactory and dangerous, and to get any good results at all must be attended to soon after infliction, when the best treatment is the immediate application of a severe blister—Cantharides Powder 1 drachm, Red Iodide of Mercury 1 drachm, Lard 1 ounce, rub up together and apply over the affected joint and see that some of the blister gets into the orifice of the wound. This treatment is often effectual, and it operates to perform a cure in two ways. First, the swelling of the skin and tissue beneath completely close up the wound and prevents the entrance of air and, secondly, by the superficial inflammation established it serves to check and abate all deep-seated inflammation. I have seen good results from the use of Oil of Cloves employed in the treatment of open joint; the material is applied with a feather into the orifice of the wound. Some authorities make a sub-division of pointed wounds, and talk of lacerated or contused wounds; by that is indicated a wound where there is great destruction of tissue by tearing or bruising. The procedure adopted in their treatment is a combination of that laid down in the cases of incised and punctured wounds, but it will be noticed that due to the amount of tissue destruction there is a certain amount of decay or mortification of the injured parts during the healing process; here the use of disinfectant solutions are indicated until the part assumes a healthy appearance.

Poisoned Wounds.

Almost the only class of wounds which may be described as poisoned from the moment of their infliction, are those caused by the bite of poisonous reptiles, snakes, etc. Unfortunately, in this country, it is rare that one gets the chance of treating snake bite in the lower animals, as the bite is generally inflicted and the animal dead before we receive any news of the matter. In cases where we have evidence that the animal has been struck by a snake, a careful examination of the bite should at once

be made in order to say whether the snake in question was a poisonous or harmless one, as the latter will bite under the stress of injury or excitement. If the bite has been inflicted by a poisonous snake, there will be found two punctures about half an inch or more apart, according to the size of the snake and width of his head. This shews the point of entry of the two fangs, as the majority of poison snakes are destitute of other teeth. If a number of needle-like punctures on a small lacerated wound is seen, then the snake can be dismissed as harmless.

Treatment of Snake Bite.

Though workers in that branch of toxicology have demonstrated that the poison of certain families of snakes vary in their chemical composition, irritative properties and lethal qualities, the treatment for snake bite in general is the same. If the bite is on a limb, put a tight band round above the bite; of course, this procedure cannot be adopted when the injury is on brisket, dewlap or lip, the parts most frequently the site of snake bite. Where possible the puncture made by the snake's fang must be opened with a sharp knife, and the bleeding part bathed with strong solution of Permanganate of Potash or of Condy's Fluid, a teaspoonful to a pint. This has been found when mixed with snake venom to completely destroy its action. Keep on at the bathing for quite an hour, and then tie up the part with a bandage soaked in the fluid. If symptoms of coma or stupor begin to appear, give doses of strong stimulants such as brandy, ammonia, etc., and keep the bitten animal warm with rugs, litter, etc.

There is now on the market a curative serum for snake bite; this is prepared by the Institute Pasteur, Paris, and is the serum from a horse which has received large and increasing doses of snake venom. It is inoculated around the bite with a hypodermic syringe, and experimentally I have had most excellent results with it.

Under the Heading of Wounds

(which one writer aptly described as a surface solution of continuity) may fitly be considered burns, scalds, and saddle and harness galls. Burns are not common in our domestic animals, but when met with are generally severe in character (burning buildings, litter, etc.) In such cases take equal parts of linseed oil and lime water, bathe the affected parts, and immediately dredge over this as much flour as will stick, and when in time this sloughs off, dress with boracic acid ointment or boracic acid (one part), vaseline (five parts). Scalds can be treated in much the same way.

Saddle Galls and Chafes.

The first thing to do in these cases is to remove the cause, see to the fitting of saddle and harness, and bathe the chafed parts with a solution—½ ounce sulphate of zinc, ½ ounce acetate of lead in a wine bottle of water. This is excellent for harness galls and chafes, and will generally effect a cure provided the sores are not further irritated by the rubbing of the harness.

Minor Operations.

If we exclude castration, the most common and simplest operation the owner of stock is called upon to perform, is the opening of an abscess, the simplicity of this operation depending considerably upon its site. A simple abscess, say upon flank, shoulder or breast, should be fomented

with warm water until a soft or fluid-like spot can be felt at one part, the knife can be inserted here, the contents removed, and the cavity washed out with some simple disinfectant. Always wherever possible make the opening into the abscess as low down as possible, then all the contents will easily drain out. If fomentation is impossible, as it is in many young animals, the application to the abscess of a small quantity of red blister (red iodide of mercury 1 part, lard or vaseline 8 parts) over an area about the size of a shilling will tend to make the abscess point and either render it ripe for the knife or cause it to burst. The blister must be well rubbed in two or three times, and the area over which it is applied should not be too large else we may get sloughing and destruction of a large area of skin and a disfiguring scar as a result. In the case of strangles (or nieuw ziekte) abscess, I always consider it advisable to bring on these abscesses as rapidly as possible, otherwise you may get the septic matter in the system, and multiple abscesses occur all through the constitution (bastard strangles). As soon as the under jaw of a horse is observed to be swelling, and the glands under the jaw assume unmistakable appearance of forming abscess they should be blistered with the blister above mentioned, and the blister re-applied at intervals of three days. As soon as the area over which the blister has been applied becomes soft on pressure with the finger and gives the impression that the contents are semi-fluid (fluctuating), a sharp, *clean* knife should be taken, and the blade wrapped to within an inch of its end with a piece of cotton-wool; stand at the side of the horse's head, facing the same way as the animal, have twitch put on the upper lip, place the left hand on the animal's head between the nose and eye to steady it, and then insert the knife into the abscess, cutting downwards and forward, and keeping as near towards the middle of the space between the jaw as possible, make an opening at least an inch in length, and squeeze out all the pus, afterwards washing with warm water and a little disinfectant, using a syringe. The things to be guarded against are stabbing the blade into the horse's throat, and cutting an artery where it comes round the jaw from the face; but with decent care this operation can be accomplished by any ordinary horseman. Subsequent treatment consists in keeping the hole in the abscess open, and washing out the cavity.

If the discharge tends to run down the neck, a little vaseline smeared there will prevent the discharge excoriating and removing the hair. If the animal seems very run down in condition, give good food and a tonic powder; take four ounces each powdered gentian bicarbonate of soda and common salt, mix well together and keep in a dry tin; a tablespoonful two or three times a week is an excellent tonic. It should be borne in mind that strangles is most infectious, and not only must the affected animal be kept by himself, but the attendant and buckets, etc., must be carefully watched, otherwise other horses will contract the disease from the affected animal.

Teeth Troubles.

Horses, as well as man, are not exempt from trouble with their teeth; as youngsters, when they change their milk for the permanent set, and in age when irregularities appear are both trying times for the horse. A horse between the age of three and four years is in the middle of his dental troubles; then the two central incisors of the upper jaw are being cast and the two corresponding incisors of the lower jaw are not yet into work which handicaps the youngster very much. It is often necessary to assist nature in removing the crown or milk teeth and so allow the permanent teeth to come into line. Haste in this matter should be most carefully avoided. If

a young horse is in trouble with his mouth, and the breath is noticed to have a foul smell, inspection will often reveal the fact that a couple of the milk teeth, generally the two central incisors in the upper jaw, are hanging on and retarding the eruption of the permanent teeth and in addition affording a lodgment for food which accounts for the foul odour. The best way to remove these is by the fingers. Wrap the hand in a coarse towel and pull away teeth, bearing in mind to twist the tongue into the back teeth and so prevent the animal biting. Afterwards wash out the mouth with a little salt and water. The presence of the persisting milk teeth frequently accounts for young stock not feeding and for a colt showing unusual nervousness about the head. Under such conditions the mouth should always be carefully examined.

Irregularities in the Teeth.

Many horses, whether as the result of the natural conformation of their mouths or the quality of their food, develop irregularities in the teeth, principally the molars. Under such conditions you have the wearing surfaces ground down in an irregular manner, sharp edges and points make their appearance and the animal rapidly goes off in condition through pure starvation, i.e., inability to chew the food and render it fit for digestion. A horse suffering from irregularities of the teeth is generally a slow feeder, and frequently, as it is termed, quids the food, or, while masticating some of the food drops out of the mouth in the form of half-chewed quids. Sometimes these irregularities become so severe as to inflict severe wounds upon tongue and cheek, and if not attended to will end in the death of the animal from pure starvation. The remedy here is the tooth file or rasp, and in order to grasp the proper method of rasping a horse's molars a few words in regard to the normal condition of these teeth are not out of place. The molars of the horse differ from those of man, and the carnivora in that they meet together on the slant, the upper jaw teeth slope from outwards towards the mouth, the lower jaw from the mouth outwards, thus the two sharp ridges to be rasped are the outside of the teeth in the upper jaw, and the inside edge of the molars in the lower jaw. In examining a horse's mouth, stand in front of the animal, grasp the tongue with the left hand and press it back between the

Tooth Rasp.

teeth of the right side of the mouth; if it is kept there there is no fear of the horse closing his mouth upon the right hand, used in feeling the condition of the teeth. A tooth rasp (see diagram), is a useful thing to have on a farm, and will repay its small cost many times.

Lampas.

Under this name horsemen recognise a swollen condition of the mucous membrane of the roof of the mouth behind the upper incisor teeth, due to local irritation, as teething or constitutional disturbance of the body in general, and the treatment generally consists of scarifying the part with a knife, rubbing in a little alum or salt, and keeping the animal on soft food for a short time. The practice of employing a hot iron is bar-

barous and brutal, as well as quite unnecessary; in fact, it is rarely indeed that even the simple scarification is necessary, all that is wanted being some mild aperient medicine.

Puncturing the Rumen in Cattle for Hoven. (Opblaas Ziekte.)

When an animal of the Bovine tribe suffers from Tympany, as the result of some error in diet, the issue to be dreaded is suffocation, due to the distended stomach interfering with the work of the lungs. Drugs frequently fail to alleviate this condition speedily enough, and under such conditions the rumen or big stomach should be punctured to allow the gas to escape. This is done on the near or left side of the flank, where the distention is most noticeable. The instrument employed is a Trocar and Canula (see diagram), and the spot, a hand's breadth from the back-bone, a hand's breadth from the last rib, and a hand's breadth from the angle of the haunch, there the skin should be cut with a knife and the Trocar and Canula driven in in a downwards and forward direction towards

Trocar, for hoven cattle, with Canula.

the right fore leg, but there is no danger attending this operation, and no subsequent treatment necessary beyond smearing the skin wound with a little disinfectant or Stockholm Tar. This operation can be performed with a knife if the proper instrument is not available, and succeeds equally well in sheep, but should never be attempted in horses or mules. The instruments mentioned can be obtained from Messrs. Mayer, Meltzer & Co., Burg Street, Cape Town.

VACATION COURSES IN AGRICULTURE.

AT RHODES UNIVERSITY COLLEGE.

(Continued from Page 413.)

LECTURE No. III.

HORSE-SICKNESS.

By Dr. A. THEILER, Government Veterinary Bacteriologist to the Transvaal Government.

HISTORY, CLIMATICAL AND TELLURICAL CONDITIONS.

Horse-sickness must have originated in South Africa with the importation of the first horses. It is mentioned in reports published in the seventeenth and eighteenth centuries, and at different intervals has played considerable havoc amongst horses and mules. In the Transvaal it is a disease of yearly occurrence, and there are few places where it has not appeared at different times. The malady does not however occur in every part of the country, nor does it appear with the same intensity every year. Even in so-called Horse-sickness regions its appearance depends on local, climatical and tellurical conditions. The high veld districts are as a rule exempt; naturally, therefore, they offer one of the conditions for successful horse-breeding. Absolute immunity does not prevail in any part of the Transvaal, for in very bad horse-sickness years—witness last season—the scourge may make its appearance almost everywhere. There is a certain connection between the relative altitude of a locality and Horse-sickness. For instance, in the highest parts the disease is the least known. Relative altitude holds good even for a renowned Horse-sickness district under ordinary circumstances. The worst places are, doubtless, the low-lying stretches of country which to a great extent are formed by the bush veld. The part midway between the high and the bush veld, namely the middle veld, experiences the disease more or less every year. The malady only appears shortly after the beginning of the rainy season in the summer Observations have caused the belief that the earlier the abundant rains set in, the earlier the disease appears. In this connection it has been observed that horses die of Horse-sickness with the advent of heavy rains in November and December, and in other years the mortality begins as late as March and April. Horse-sickness, however, does not seem to affect all horses in a certain locality. It is well known from experience that good stabling

affords relatively good protection. It has also been observed that horses let loose during the day for grazing—in unfavourable districts—contract the disease less easily than horses let out at night. Therefore, in many places we have in use the practical rule, that the animals shall only graze after sunrise and before sunset. This circumstance brought forward the theory that dew must be the cause of the malady, and that its avoidance would mean protection. It must however be noted that although the above-mentioned observations are to a great extent correct, they are not absolutely or universally applicable. Horses die from this disease which were kept in the best stables, and that touched neither grass moist with dew nor came outside the stable during the night. The dew theory, therefore, does not explain all the circumstances under which Horse-sickness occurs. The disease disappears quite suddenly at the beginning of the cold season; and eight days after the first frost has set in, the malady is usually extinct as an epidemic. These observations are correct with only a few exceptions, namely, Horse-sickness often occurs in isolated cases after the first frost. As a matter of fact there is not a single month of the year in which animals do not die of the disease, this is, of course, in different years and in different localities, especially in the bush veld.

Horse-sickness is an inoculable disease of horses and mules, but it is not contagious in the strict sense of the word. The donkey is supposed to be immune, although he can be infected artificially and does not die from the effects. It has repeatedly been observed that horses eating out of a manger in which a dying horse had discharged a considerable amount of foam, did not contract the disease as a natural consequence. Nevertheless the discharge is infectious if introduced beneath the skin of another horse. As a matter of fact it has been proved by hundreds of experiments that Horse-sickness can be produced by the subcutaneous inoculation of any diseased material taken from a horse that has died of Horse-sickness. The disease thus produced does not in any way differ from that contracted naturally. From the above circumstances it has been possible to ascertain that the different forms of Horse-sickness—Dunkop and Dikkop (Blue Tongue)—are one and the same malady. For instance, blood from a horse which died from Dunkop injected into two other horses in the same quantities and under the same circumstances, can produce Dikkop in one and Dunkop in the other. The transmission of the diseases from one animal to another by inoculation points to the conclusion that we have to deal with a germ or micro-organism which enters the system, develops, and produces the disease through its obnoxious activity. It has, however, not been possible to demonstrate this micro-organism, and very likely we shall never be able to do so, because it must be so small that even with the highest power of the microscope we cannot detect it, neither can it be grown on artificial media, as is done in the cases of other infectious diseases, for instance anthrax, glanders, consumption, etc. The proof that the micro-organism is really as small as indicated lies in the fact that by passing a small quantity of blood or fluid out of the lungs of a horse which has died of the disease through a Chamberland porcelain filter, where through the microscope no visible micro-organism can pass, and by injecting this filtrated fluid into a horse, the effect is to produce Horse-sickness in every instance. Although unobservable by the microscope, it was thus possible to study the nature of the germ or micro-organism, which must be there all the same, by using the blood and other material from a sick horse. In the following notes, therefore, the word virus is substituted for micro-organism or germ. This virus can retain its virulency for several years, if kept in a liquid state, and even when the blood has become absolutely putrid and decomposed. Neither the cold of an ice-box or the heat of even 140° F. are able to kill it, but it loses its virulency as soon as it is completely dried under ordinary temperature, and even in the shade. The liquid virus promptly

produces the disease when injected subcutaneously, and the quantity required differs very little between different horses. As a rule one single drop, or even less, is sufficient to produce Horse-sickness. Virus given through the mouth also produces the disease, but in this way the quantity required in the writer's experiments was never less than 6 to 8 ozs., or so many thousand times more than is necessary when injected through the skin. These experimental facts compared with the empiric observations on Horse-sickness mentioned in the introduction of this article, enable us to perceive that the dew theory in reference to the production of the disease is impossible. We cannot understand how the virus should come in the grass, nor could we understand how it could keep its virulency in the grass as long as twenty-four hours, half that time being sufficient to kill it by drying out; moreover, the quantity required to produce the disease through the mouth is enormous, when compared with that required through the skin. Therefore, led by experimental facts, we are entitled to believe that the ordinary disease is contracted through the skin. We have accordingly to look for an agency which is not far away, namely, that of blood-sucking insects. It is a well-known fact that Redwater is carried by ticks; that the tse-tse fly carries the tse-tse disease; that mosquitoes of the culex family carry human filiarisis, and of the anopheles tribes, human malaria. The analogy between Horse-sickness and human malaria is striking, and the conditions for both in South Africa are more or less the same. We are also led to believe that we come to a true explanation if we lay the cause of Horse-sickness to the charge of a tribe of mosquitoes, thereby explaining why the disease occurs in low lying, moist parts of the country. We can also understand why it is mostly contracted after sunset, at which time these insects begin to fly and to be troublesome. Moreover, the theory of the blood-sucking insects as carriers of the disease explains why Horse-sickness can travel from the low veld into the high veld in certain rainy seasons, which are very favourable for the breeding of insects; further, why it attacks stable-kept horses less than others; and lastly, why it disappears shortly after the first frost, since cold is detrimental to all sorts of insects. The various parts of South Africa are not all inhabited by the same species of mosquitoes; there are certain localities which contain certain species, and we know that the conditions of temperature and climate largely influence the distribution of these insects Human malaria again offers a very good example of this phenomenon. This is a mosquito borne disease, and although the carriers are found everywhere, human malaria is only present in particular parts. The probable reason is that the species which carries this human disease can only thrive under the favourable conditions of an optimum temperature. With regard to the annual appearance of Horse-sickness, it is evident that the earlier we get rain, the earlier mosquitoes will appear, because during the first stage of their life cycle—the larval and nymphal—mosquitoes depend entirely upon water, therefore the more water obtainable the more prevalent these insects will become, and naturally if our Horse-sickness carrier is amongst them it will have all the essentials for its propagation. The mosquito theory explains all the many facts which would otherwise be shrouded in conjecture. For instance it explains why Horse-sickness may be observed in a good stable, just as well as in a bad one; why the disease is not so frequently observed in high altitudes as in low ones, and finally, why the disease disappears suddenly after a heavy frost.

It has often been asked that if mosquitoes are really the carriers of Horse-sickness why, as they prefer indoor life, is the disease not more frequently encountered. Careful investigations have shewn that mosquitoes are very rarely found in stables. Experiments made with a view of feeding mosquitoes on stabled horses, have resulted in failures. There seems to be some active medium in the stables which is disliked by these insects, and we

are justified in saying that the fumes of ammonia given off by decomposing urine in stables, are probably responsible for their absence; another fact which seems to confirm this theory is that horses living outside are more readily bitten by mosquitoes than those kept in stables. The theory of the propagation of Horse-sickness by mosquitoes from one season to another, by a transmission from horse to horse of the virus of the disease is open to some objections, which at first sight appears somewhat difficult to explain. It may be asked if the disease is carried by mosquitoes which are killed by frost, how is it that the disease re-appears season after season, and how is it that mosquitoes can communicate the disease to horses brought into localities in which for years previously there have not been any horses? The first objection is obviously answered by pointing out that infected mosquitoes may survive in a dormant condition in sheltered localities and may start the disease the following season, whilst the second difficulty which lies in the way of accepting the mosquito theory may be overcome if we assume some other species of animals besides the horse suffer from the disease, and in this way mosquitoes may become infected which have never come into contact with equines at all. Indeed an observation of facts leads us to believe that it is very likely that other animals may perpetuate infection in the absence of horses. An injection of dogs and goats with Horse-sickness virus has been followed in some instances by the development of the disease, the former die from it, the latter recover. What may be done under artificial conditions may confidently be expected to occur under natural conditions, and the theory that other animals besides horses acquire Horse-sickness seems to be very feasible. Although these theoretical deductions have not an experimental proof in every instance, they notwithstanding help us in the application of self-suggesting measures. The general practice of keeping horses indoors after sunset and before sunrise is a sound one, since it keeps them free of blood-sucking insects. We have seen that stable protection is to a certain extent reliable, and the reason has been explained, but it is also known that in very bad Horse-sickness years the protection offered by stables occasionally is not sufficient. We can therefore improve on this protection, and the arrangement of the facts are obvious. Insect proof stables will probably mean free of Horse-sickness, and if we can render the atmosphere obnoxious to mosquito life we increase the security of the horse. Mr. Watkins-Pitchford, of Natal, has demonstrated that horses kept in the worst Horse-sickness parts of the country do not contract the disease when kept in an insect proof cage. He has further demonstrated that horses kept in a stable, which is constantly smoked, obtain a great amount of protection, and for several years this procedure has been carried out in various parts of South Africa with great success. In cases where it is not possible to effect an insect proof stable, this smoking should be carried out. For this purpose it is advisable to make a smouldering fire alongside the stable; the smoke is let into it by means of a pipe; or another method, which is almost as effective, is to keep a smouldering fire at the door of the stable, of course under such conditions that no danger could accrue to the animals, for instance, by burning manure in a paraffin or iron tin. The objections to this method are unfortunately rather numerous, particularly in the case of a traveller who would be unable to carry out these recommendations owing to the absence of a stable. Again, in a horse-breeding district, where a certain amount of reliance has to be placed in Kaffirs, the method does not forcibly recommend itself. Further preventive measures with regard to mules will be alluded to later on.

Horse-sickness Symptoms.

General observations have revealed the fact that the disease only breaks out at the close of a certain period after it was contracted; which

period is generally believed to be about eight days, and is called the incubation or hatching time. The popular opinion is that after this time the disease breaks out suddenly. This is certainly true with regard to the more obnoxious symptoms which really indicate nothing else than the crisis or fatal ending. Experimentally we find that in most cases the incubation time lasts from five to seven days, followed by the disease, which runs from three to five days. But this disease shews itself first only by the rise of temperature, and exhibits no external signs. This rise of temperature as the first symptom of the disease, can be seen in every case, whether of the Dikkop or Dunkop form. The normal temperature of a horse, taken in the rectum, varies between 98 to 100 F. from morning to evening. This, of course, holds good only for stable kept animals, as exposure to sun, working, etc., will influence it considerably. In Horse-sickness the temperature now rises gradually from morning to evening, and then drops during the night to a little higher than the morning before, and keeps on in this way from three to five days, when outward symptoms reveal a feverish condition, the temperature being then very often at 104 to 106 F. Now all at once the crisis may develop very quickly, and very often not more than half an hour elapses before death sets in. This happens mostly to horses while being worked. In a general way the disease usually runs longer, from several hours to several days. Before describing the external symptoms more closely, I wish to state that experiments have proved that the incubation time, although very seldom under five to seven days, lasts comparatively much longer, from fifteen to twenty-five or even thirty days. These exceptions are responsible for many incorrect conceptions regarding the disease.

Dunkop.

A better name for this form would be the "Pulmonary form," as the trouble chiefly lies in the lungs. As the final stage is the most striking, I will describe it first. The animal is seen to be suffering from want of air, and shews the symptoms of suffocation. The respiration is hurried to the utmost, all available muscles are brought into action to expand the lungs; the stomach is "tucked" up, the ribs move backwards and forwards, the forelegs extended, also the head and neck; the nostrils are expanded; sweating breaks out all over the body and the features look very anxious. The specific symptom, which is the cause of all this trouble, is a discharge from both nostrils, at first slightly yellow, brought up at intervals by attacks of coughing; finally whitish-yellow foam is thrown out by the shaking of the head and neck, after which the horse usually dies, staggering about before finally dropping. Sometimes the symptoms are not quite so severe, very often there is only a slight discharge, and cases may even be seen without discharge or where the white foam is only expelled after death. Very often the patient may be seen feeding up to the very last moment. A horse may recover in all of the above described stages, but chiefly when the alarming symptoms are absent. A careful observer will, however, be able to discover Horse-sickness before the described final stage. To do this it will be necessary to record the temperature during the day, the frequency and quality of the pulse, and the respiration and colour of the visible mucous membranes. Fever is always present, and is typified by its continual rise and fall during the course of the days as mentioned. The normal frequency of the pulse is 36 to 40 a minute. For the first two days nothing abnormal will be noticeable on the artery, but afterwards in the same degree as the fever rises, the pulse will also increase. It will be more frequent in the evening and decrease a little until the morning to increase again in the evening. So, very often, 60 to 70 pulsations may be counted in the evening, and the following morning there will perhaps only be 50.

As the disease advances there can be from 80 to 100 pulsations, and just previous to death as a rule it becomes very weak, until at death it is absolutely impalpable. The respiration augments in the same way as the pulse, the normal frequency being about 10 to 16. When it is at its highest, about 80 to 100, the contractions of the flanks can be counted. The character of the respiration can best be judged during the hottest time of the day, when it is naturally increased. Then very often it can be observed that alongside the false ribs a line is formed (tucked up) from which the contracting of the ribs on the one side, and of the flanks on the other can be seen. This symptom may disappear towards the cool of the evening, but comes back again and gradually increases until death. A further early symptom is the reddening of the mucous membranes of the eyelids, which is usually observed after the onset of the fever, either as a general congestion or a stronger injection of the blood vessels, or even apparently spotted with blood. Slackness and loss of appetite may sometimes indicate the presence of the disease before it can really be recognised as Horse-sickness.

Dikkop.

This form may be called the "cardiac" form, as on *post-mortem* examination we find the heart most obviously attacked. It begins exactly in the same way as the Dunkop or pulmonary form, except that the lung troubles do not set in so severely. The frequency of the pulse, however, is increased at an earlier period, and changes sooner and oftener in character, becoming weaker and weaker. The congestion of the mucous membrane of the eye is also very early and more intensely marked. The typical symptom, however, is a swelling which appears, as a rule, first above the eye, the cavities appearing to be blown up. The swelling may expand all over the head, down the neck and even as far as the back. The eyes are partially pressed out of their sockets, often very tearful, and have a glaring aspect with the eyeballs protruding. These symptoms usually occur and are most pronounced when the animal has the highest fever, or shortly afterwards; at this stage the animal usually dies. There exists a very marked and general weakness of the muscles; the animal lies down at frequent intervals, changes its position or the position of the hind feet, and symptoms of colic are not rare. The lungs not being attacked, symptoms of suffocation are absent. In a sub-form of Dikkop usually described as Blue Tongue, the swellings are very marked in the mouth, its mucous membranes being purple, the tongue protruding between the teeth and the jaw, and lips swollen. Between these two forms of Horse-sickness are many transitions. The writer's experience has shewn that it is only in exceptional cases that very marked Dikkop ends with the symptoms of Dunkop; therefore the former form seems to last longer than the latter. This points to the conclusion that most cases of Horse-sickness would end with Dikkop if the lungs could resist long enough. Observations in case of recovery shew, however, that a pure Dunkop case can recover without shewing any signs of swelling. Cases where symptoms of swellings above the eyes and pulmonary troubles occur at the same time can also be observed.

From the above it can be seen that the symptoms of Horse-sickness vary very much, and to make a diagnosis it will be necessary to take all the signs of both forms into consideration. The recovery from both forms of the disease takes about the same time as the development of it. The temperature gradually drops again from day to day; the respiration and pulsation decrease in frequency and improve in quality, and the swellings disappear slowly. The average period occupied before the disease ends fatally is five days, and the average time occupied until recovery is about ten days, followed by a long period of convalescence, the animal losing most of its flesh during recovery.

Post-mortem Appearances.

In the pulmonary form of Horse-sickness we find, as a rule, the lungs attacked in a very marked manner. The whole of these organs are very much swollen, and have a greenish-yellow colour, caused by the infiltration of the pleura and the lung tissue by a serous fluid, which can only emanate from the blood. The expansion of the lungs beats this fluid into foam, as any albuminous fluid will become when agitated. This foam goes into the wind pipe, blocks the entrance of fresh air, hence the suffocation. In cases where the disease is well pronounced, it can be observed that the lining of the lungs (pleura) becomes thickened in patches, some of them as thick as a finger and of a greenish-white colour, sometimes very friable; nevertheless having a certain resistance. These appearances indicate that the disease must have run for some time, although external symptoms were not noticed. In contra-distinction to pneumonia of horses all pieces of a lung from a Horse-sickness subject float on the water, while the hardened parts of a lung from a pneumonia carcase sink. The principal lesion in Dunkop is the general infiltration of serous fluid in all parts of the lungs, which does not coagulate, and is termed "œdema." There have occurred cases of death through Horse-sickness which have ended with the symptoms of Dunkop, minus the discharge from the nostrils. These latter cases as a rule end very rapidly, and on *post-mortem* examination nothing can be found wrong with the lungs. In these cases there can often be observed a very marked inflammation of the mucous lining of the stomach, which shews a deep red or purple colour. In Dikkop we find the lungs as a rule clean, perhaps of a darker colour than normal, but not at all, or very slightly, œdematous. The inner lining of the heart, especially the left ventricle, is spotted or stained with coagulated blood, which lies under the lining and cannot be washed off. The serous infiltration can be found in all the swellings of the head and neck, under the skin, and between the muscles, often mixed with blood extravasations. As may be anticipated, complications of the two forms may also be noticed on *post-mortem* examination.

Resistance, Immunity and Inoculation.

Not all horses are liable to contract Horse-sickness in the same degree, even when exposed to the same conditions, and this is the case with mules also. Animals bred in the Transvaal seem to have more resistance than those which have been imported. The different degrees of resistance can be experimentally demonstrated. For instance, it can be seen that the first animal will resist a dose of virus which is fatal to a second, and a third animal may even resist a larger dose than that which kills the second, and only contracts the disease when the quantity of virus is further increased. The same can be observed under the conditions of natural exposure. Some horses which have been regularly exposed have gone safely through one Horse-sickness season, and yet, under the same conditions, may perhaps die of the disease the next season. Again, some horses resist exposure in one locality, and die when removed to another where the disease is more prevalent. The different natural resistant qualities in the animals can also be understood if the theory of the blood-sucking insect is taken into consideration, and the oftener an animal is bitten the sooner it will catch the disease. Some horses resist a comparatively large quantity of Virus, and it therefore requires the bites of a greater number of insects to affect them. Once we know exactly which insect carries and disseminates Horse-sickness, we shall, to a certain extent, be able to ascertain to what degree a particular locality or season is dangerous for horses.

Referring back to the outlines of preventive precautions mentioned in the earlier part of this paper, it is obvious that the insect-proof stable is

useful to a certain extent, but is inapplicable in many cases. It is, therefore, quite natural to desire a better protection, and this can only be done by rendering an animal immune, that is to say, by passing him through an attack of the disease, so that biting flies or insects cannot subsequently infect it with Horse-sickness virus.

For some time it has been noted that an animal which has recovered from an attack of Horse-sickness is immune, or what is commonly known as "salted." It has further been noted that immune horses can be exposed to all conditions of climate with but little danger of again contracting the disease. With regard to this latter observation it must be remembered that animals may contract Horse-sickness a second time, and this fact has been observed to be the case when a horse has been salted in one part of the country, and is transported to another district. Certain localities are known in this country of which it is said that when a horse is salted there, it will be immune for the remainder of the country.

The fact that rendering an animal immune gives him a certain protection has been based on the inoculation against this disease, which was introduced into practice in November, 1905. We have been able to immunise mules against Horse-sickness by a simultaneous injection of serum and virus, but, unfortunately, we have not yet been able to introduce a similar method with equally successful results to horses. It seems that the mule, although as liable to the disease as the horse, recovers more quickly than the latter, and it is evident that the factor which helps him is due to some inherited power of resistance transmitted from his sire, who as we know, although susceptible to Horse-sickness very seldom dies from it. Another factor which we have had to contend with is that a "salted" horse is more susceptible to a subsequent attack of Horse-sickness than a "salted" mule. Since November, 1905, the inoculation has been carried out on some 8,100 mules, in all parts of the Transvaal, Rhodesia, Natal, and to a small extent in Cape Colony and Bechuanaland Protectorate. The results have been very satisfactory, the total loss from the inoculation only amounting to 3·7 per cent. We have every reason to believe that it will be possible to improve this inoculation at some future period, and also to reduce the mortality to almost nil. The past season has been the worst experienced for about thirty years, and our mules have stood an excellent test. Of the 8,100 mules exposed only 1·2 per cent. have succumbed to a second attack. Even this figure is probably on the right side, since, of course, it is impossible to verify every case of reported relapse, and we have therefore been compelled to give the farmer the benefit of the doubt. On the other hand, of course, there may be several deaths from undoubted Horse-sickness amongst the immunised mules which have not been reported. The figures representing the mortality among non-inoculated mules in the Transvaal may be safely put down—and this is a very moderate estimate—at 1,000. In other words the application of our inoculation method would have saved at least 950 of these animals.

The relapses amongst inoculated mules referred to above have been the starting point of a new series of experiments, and these have confirmed the observation that animals may contract Horse-sickness more than once, and the so-called "Aanmaning," or relapse of a healthy salted horse or mule, is no longer a doubtful occurrence. Various kinds of Virus have recently been collected, but experiments were made more especially with three, and the fact remains that equines, although immune against Horse-sickness may be re-infected twice or three times, and even more. We are not able to break the immunity of any horse or mule by the injection of such enormous quantities of virus into its system as is necessary to kill 10,000, provided that the virus is of the same strain against which the animal was immunised; yet we are able to break the immunity with a comparatively small quantity when the virus is of a different strain. There are accordingly in South

Africa various strains of Horse-sickness virus, all of which cause the same disease, all of which are similar to each other, but differ in the respect that immunity obtained from one strain does not protect against another strain. This explains the various virulency in different parts of the country, and is of the greatest importance. This observation was a severe set-back, since the requirements of the country will be for animals to be immune against all strains, a task which hitherto we have been unable to overcome.

The immunisation of mules against Horse-sickness, therefore, will only be complete when we are able to protect them against all the different virus encountered in South Africa.

LECTURE No. IV.

FRUIT CULTURE.

By H. H. HARDS, Sunnyside, Grahamstown, President Eastern Province Board of Horticulture.

To treat the subject of Fruit Culture as it deserves would require much more time than is placed at my disposal; one lecture on each of the points mentioned on the syllabus would hardly suffice. When such men as the renowned Wickson publishes a book of some 500 pages of closely printed matter on this part of horticulture alone you will readily realise that I can hardly touch the elementary portion of it during the time we shall be together. I shall therefore avoid as much as possible the technical and theoretical parts and confine myself to the more practical. My object will be to place before you the practical side of growing fruit, starting from the time you have decided to put the trees in and continuing up to the time the trees have arrived at the bearing stage, and you have picked, packed, and forwarded the fruit from these trees to the market for consumption. At the same time I shall endeavour to make my remarks practical and intelligible, so that you may be able to plant fruit trees at once, even although you have not hitherto studied the subject.

The value and actions of manure, sap flow, and many other important items must be left for other occasions or for you to study for yourselves. There are many standard works published to which you may well devote some time.

I do not claim to have discovered anything new of which to inform you, as many better men than myself have written and lectured advocating more or less the principles now recommended, but there is this advantage, that the remarks and advice I am about to make and give are based on my own practical experience and observations.

Probably all of you have at your farms a number of fruit trees, and to those who have not interested themselves in their growth and habits I would advise them to take the trees in hand and gain some practical knowledge for themselves. Knowledge obtained this way is of greater value than that learned from reading, although reading will greatly assist in obtaining that practical knowledge. The habits of the different varieties of fruit are so great that one would have to describe each separately to make a beginner understand them fully.

Climatic Conditions.

Little need be said on this subject, as most parts of the Colony have already been proved to be favourable to the fruit industry, as the many old trees standing to-day will testify.

Soil.

This also may be passed over in a few words for the same reason as above. Most farms have a certain amount of suitable soil. It is not necessary to have such a great depth of rich soil as many suppose. Some orchards planted in a very deep alluvial deposit have not proved the success which the owners anticipated, for the reasons that the trees instead of coming into bearing when they should, continue to make enormous growth of wood, to the detriment of fruit. To my mind the nature of the sub-soil is of equal, if not greater importance, than that of the surface soil. With a depth of 1½ to 2 feet of top soil and a gravel sub-soil most fruit will do well under the conditions to be referred to later. On no account plant fruit trees over clay sub-soil.

Preparation.

Now let us assume we have the climatic conditions, our soil is suitable, and we have decided to plant fruit trees. Our first consideration should be the preparation of the soil so that it may be ready and in the best condition by the time the planting season comes round. If the soil is virgin, all that will be necessary will be to plough and sub-soil, cross plough again, and if it is poor, sow any leguminous crop, say beans or peas, to economise. We can harvest the crop either green or dry and plough in the tops. The crop will, if a good one, realise the cost of preparation if the market is favourable. If the soil is of a heavy nature as well as poor, then we will sow barley thickly, and if there is time, cut the first growth, allow it to grow again until about a foot high, then plough it in. If there is not time, plough in first growth. The leguminous crop will supply the nitrogen to the soil and the green barley the humus. Another ploughing and harrowing will be all that is necessary. We must, however, keep all weeds down, and where necessary make the surface fairly level. Should we decide to utilise old lands, then one ploughing and sub-soiling will do, but, unless they have been recently manured, it will be necessary to put in the leguminous crop before ploughing, and barley too if required, or dress with a liberal supply of stable manure. To describe the kind of plough or how to plough is not my intention, as most of you are already conversant with this operation. It will suffice by drawing your attention to the fact that fruit trees are deep rooted, so the greater the depth you can go the better the result.

Orchard.

The best position for an orchard is a gentle slope to the East, but one to either North or South is suitable. Leave the West slope alone, unless well sheltered, and you have no other position more favourable.

Laying Out.

Having decided the distance apart we intend planting, the number of trees, and soil having been prepared, we can start to lay out the orchard. This should be done in time to allow the holes to be dug before the trees

arrive—say, a month before. The equipment is a simple one, merely a copper wire 100 yards long, with small lumps of solder marking the distance from tree to tree. Have this coiled on a drum with a hole through the centre—the frame that barbed wire is wound on answers very well. Plenty of stakes will be required, about 18 inches long, made from some white wood for preference. The Spanish reed cut to suitable lengths is the best, as it is light in weight, easily seen when put in the ground, quickly cut, and cheap. We want to add to our outfit a mallet or two to drive in the stakes.

Having squared one corner we run the copper wire along, placing one of the stakes at each mark, and this will be repeated until the whole ground is laid out. If this is done carefully, no matter which way you look over the prepared ground, a straight line will be visible to the eye, and this is as it should be. We now require some more stakes about 9 inches long and a planting board. The latter is made with a piece of wood, say, 6 feet x 3 inches x 1 inch, with a V-shaped notch cut out of the centre, another notch at 6 inches from each end, a stout piece of string 2 feet long, with a loop at one end and a short piece of wood secured at the other, will complete the equipment. With a bag of stakes, this board, and a mallet, we start working—always one way—by laying the board on the ground parallel with the line at right angles with the centre notch against the corner stake. Hold it firmly by placing one foot on it either side of stake, driving a small stake in both the other notches, repeating this until the whole is done. The boys can now commence digging the holes, after having first marked out the circle with the piece of string mentioned. The centre stakes can now be all collected and stored in a dry place for further use. The holes must be as deep and wide as we can reasonably afford to make them. Four feet in diameter by two deep, with the bottom of hole picked loose, is good enough. Great care must be exercised not to remove either of the side stakes., as these are your only guide to planting in a straight line. It is so easy for those digging the holes to displace either during the operation. When digging the holes have the top soil placed on one side, breaking any lumps there may be, and place the bottom soil on the other side, pulverising it the same way. The sub-soil at bottom of hole must now be picked as deeply as can be done, broken up, well stirred, but not taken out.

All your soil and the walls of the hole are now exposed to the air and sun. The action of both will break any clayey particles of the soil, and the walls of the hole will crack in all directions unless it be of a very sandy nature—thus letting the air further into the soil and removing any sourness there may be. The object being to allow oxygen to come in contact with as much of the soil as possible, preparing it for the young roots of the tree. If you take note of the condition of the soil on either side of and in the walls of the hole at the time of digging, and compare the same with the condition a month later, you will realise the advantage of the climatic operations.

Wind Screens.

We must at the time of laying out the orchard (or preferably a year before) make provision to shelter the trees from the violent Spring, Summer, and Autumn winds, by planting a hedge of some quick-growing tree, such as the Lombardy Poplar, Macrocarpa, or any other (but not the large gum) will do. This screen must not be nearer to the fruit than 30 feet. The first named has the advantage of having a dense growth during the time it is needed, and is sufficiently open during the dormant period to allow the hardening winds to get at the fruit trees. These winds are in every way beneficial to the trees at this time of the year; while the latter is dense the whole year round, but then it is always

green and pleasing to the eyes when the orchards are cold looking and bare.

Trees.

We now come to the important part of selecting what trees are suitable to our situation to give us the best return for the outlay. To be brief: If near to a port, and with the view of exporting, all fruits that will do well can be chosen. If far away from your market or port, then avoid soft fruit, such as apricot, peach, plum, etc.—unless you intend drying—and put in apples, pears, oranges, etc. What kind and varieties to plant is too long a question to go into now. You must be guided more or less by the many conditions surrounding your venture, such as what fruit is doing well in your neighbourhood, what is required by the public, and, the most important of all, what will pay you best.

The many catalogues supplied by the nurserymen of this Colony will assist you in selecting what you want, and I shall at all times be pleased to give you the benefit of my experience.

Stocks.

A great point is to obtain whatever kind you decide to plant, on the most suitable stock. The following list will guide you to this:—

Apple...	On Northern Spy (B.P.)
Pear	Pear seedling.
Peach	Peach seedling.
Apricot...	Peach seedling.
Plum, Jap.	Peach seedling.
Nectarine	Peach seedling.

Selection.

Then see that the plants are well grown. A visit to the nursery will be time well spent, and can be done at the end of the growing season. It will be advisable to place your order at the same time you are satisfied that the trees will suit you. This may avoid disappointment later on.

Choose nothing but the best varieties of the kinds you have decided to grow, and of these the best grown trees.

Plant stone fruits at the age of one year from bud or graft.

Apples at the same age, if good, well-grown trees are obtainable, otherwise buy two years old.

Pears: Put in nothing under two years or over three years

On no account be persuaded to take apples on anything but blight-proof stocks. The growth may not be so rapid as in, say, the Sweet Apple, but the disadvantage—which I do not admit—is more than counterbalanced by the comfort in knowing that, if the Woolly Aphis (American Blight) comes along, which it is almost sure to do sooner or later, the roots of your trees will be free from the attack of this pest. I can assure you that there are many growers of apples this day who are intending digging out ten-year-old trees to replace them with blight-proof stocks.

Distance Apart.

There must be no doubt in our minds as to the distance we intend planting between each tree.

Apricots should be 30 feet apart all ways.

Apples and Pears not less than 20 feet.

Peaches and Jap. Plums not less than 18 feet.

For the sake of uniformity and easy cultivation it will be well if we made all stone fruit 20 feet apart.

Planting.

The trees have arrived. If they have been delayed on the way and are dry, place the roots and part of the stem in a tub of water for some time; if they are fairly moist—which they should be if properly packed and the journey has not taken more than a week—this can be dispensed with, and the whole heeled in near the spot it is intended to plant. To do this make a shallow trench long enough to take all the trees, one side perpendicular, the other slanting. After separating each kind and variety, loosen the bundles and lay each tree horizontally in the trench with the roots to the perpendicualr side, being careful that the tree with label on separates one variety from the other. Give the roots and tops a good sprinkling of water, if not already been soaked in it, then fill in with the soil taken out of trench—if lumpy break up until fine—and see that the roots and half the stem are well covered with moist soil. If the day is hot then throw a few old bags over the exposed tops. The trees will now be safe, even if planting cannot be done for fourteen days. It should not, however, be delayed unless absolutely necessary.

When we are ready to start planting lift the trees gently from the trench by grasping the stem firmly and pulling them to the perpendicular. Trim with a sharp knife any roots that may have been broken—all ends of roots an eighth of an inch should have the end cut clean—making all cuts from the centre outwards.

Take out as many trees as you can easily plant before the roots have time to dry out, placing them in a wet bag that will cover the roots and most part of the stem, and proceed to plant.

Previous to this, to save time, the holes should be partially filled in with the surface soil taken from the hole when dug. For this purpose a man should precede the planter. The soil should be shovelled continually into the centre of the hole until the point of the mound so formed is a little above the surface. If it is a hot day no more holes should be so filled than can be planted that day, the object being to have cool, moist soil in which to plant the roots and give the infant tree all possible assistance to start growing. Now place the planting board described under the section "Laying Out of Orchard," see that the two pegs in the ground—one on either side of the hole—come into and are held firmly in the V-shaped notches at either end. Press the mound of soil down firmly with the foot. Select your tree and place it in the centre notch, and see that the mark on the stem which shows at what depth it was planted in the nursery is on the top of the board. This is very important, so that they may stand planted in the orchard at the same depth they stood in the nursery. The tree must now stand quite upright and the roots be equally distributed and spread with the hands round the mound of soil, with the ends pointing downwards, and see that none are twisted round each other. The planter must still retain his hold of the young tree with one hand, working in the soil firmly as it is shovelled in with the fingers of the other; when sufficient is worked in the tree will remain firmly in position, the board may be removed, and the other trees planted in the same manner. A man should now follow filling in the hole loosely with the top soil taken from near the hole; when that taken out is exhausted to within about three inches from the surface, be careful not to shovel the soil near to the stem,

but from the trench formed round the inner edge of hole. Another boy comes along, and with his hand arranges the soil to form a good-sized basin to hold five or six gallons of water. The next boy does the watering. The first can-full preferably with a coarse rose on can. Not less than five or six gallons should be given to each tree. After the water has entirely disappeared, the holes may be filled and evenly levelled with the surface. When the planter has planted as many as he considers the boys can finish watering and levelling before night he can proceed to the first tree, see that it is quite upright, or, if in an exposed position, inclining slightly towards the windward side, and tread the soil gently round the stem. All hands are now busy filling up holes round trees and levelling them off. The bottom soil taken out from the hole when originally dug can now be used in filling others made and for levelling generally. Do not put any bottom soil round trees. This soil after exposure for some time will be equally as good as any round it. With the feet on either side of stem, the left hand holding it tightly, cut back the young tree with a sharp knife to within 2 feet 6 inches of the ground, being careful to cut near to a bud which is desired to form one of the main branches of the tree. The operation of cutting back and treading the soil may be done to advantage the next morning when the water has had more time to distribute itself in the soil and the earth is firmer. At this time all the lateral branches or shoots should be cut off, but not so close to stem that the buds—so often found at the base of these laterals—are damaged, as we may require any of them to form the tree. The last operation is to paint the wound at the top of the tree with a thick oil paint, being careful that not sufficient is put on to run down the stem

Nothing has been done with the nuseryman's labels. They are, of course, on the tree at the end of each row, but they cannot remain there; before removing any make a note in your pocket-book after each day's planting of the number of the orchard, and the number of rows, or part row, as the case may be, of each kind of variety of fruit so planted so that you may any evening—and the sooner the better—draw a plan of the orchard in such a way that anyone can take this plan or chart and name any one tree in the orchards.

If we are planting on a large scale then it will be advisable to arrange our trees in blocks. For example, say we intend planting 1,000 each Apricot, Peach, Plum, Apple, Pear, we should have one orchard of each, and would find that this arrangement would look more uniform, be more convenient to cultivate between the trees, and to harvest the fruit. But if we are only planting one small orchard, then the different kinds should be planted in alternate rows of one Stone fruit, and one Apple or Pear, being careful to have each variety together, except in the case of the Pear, which should be mixed, say, two or three of each variety, followed by the same number of another variety, and so on. By planting stone fruit, such as Peaches, Plums, etc.—not Apricot—between rows of Apples or Apples and Pears, we will have more space between rows when they grow up. The trees all being planted and the soil all round them being fine and loose, the cultivator should be used both ways to finish off the work for the time being.

Training.

Assuming that the planting has been done during the beginning of August—which is a very good time, as the soil is becoming warmer—in a short time a number of shoots will appear up and down and around the bare stem. It is the practice of many to rub off all these but three or four. This may be the right thing to do in a moist climate, but here I am convinced it is wrong and in practice have found it better to allow

them all to grow until they are 2 to 3 inches long, and then to select the three or four—not more—which are to form the tree. Start 15 inches from the bottom, decide which shoot to leave, then choose the remainder, the object being to retain those in such a position as to evenly arrange the future main limbs round the tree, thereby balancing the head. All other shoots when they have grown to the length mentioned (2 inches) must now be pinched off at the point. They will then produce two or three leaves, which will protect the stem from the sun during the summer, and so prevent the bark from being sun-scalded. I have had under my care many trees which have suffered in this way, and their growth has been considerably retarded in consequence. So don't rub off buds as they appear, but rather carefully spare sufficient of them to form the protection mentioned. All can be cut off clean when the trees are dormant during the next winter at the time the pruning is done. Keep a good look-out for caterpillars and injurious insects of all kind, and destroy them before they do any harm to young shoots.

Cultivation.

From the time of planting the orchard must be kept free from weeds and well cultivated, with the hoe immediately round the trees, and also with the plough. Use the cultivator and harrow all ways between them. One ploughing when the leaves begin to fall, another crosswise in the very early Spring, the disc harrow and cultivator to be kept going to keep the surface fine and loose, thus conserving the moisture that is below. The object of the first ploughing is to retain in the furrows the leaves that fall from the trees, thereby storing up more humus in the soil. Although one should make a rule that no weeds are to survive in the orchard—it is a difficult matter to keep them down, especially in a wet season. The last season has been a particularly bad one, and it has been impossible to keep weeds down. An exception may be made between the two ploughings, which will be winter, and the weeds allowed to grow at their own sweet will, when before they seed they can be disc harrowed and ploughed in. This will also add humus to the soil. No exception must be made in the immediate neighbourhood of each tree. This must—for a space of 3 feet all round—always be kept clean and well stirred all the year round, bearing in mind that the roots of the young tree for the first year are directly under.

Pruning.

This in itself would form a long and interesting lecture, but, as already stated, my time is limited. I must therefore forego the explanation of why this or that should be or not be done, and endeavour—more by illustrations than words—to make it clear to you.

1st. The object of this operation.
2nd. When it may be done.

The object of pruning is to shape the tree so that it will be well balanced, encourage a large fruit-bearing area, fine and sound fruit in large quantities, though not to the detriment of future crops or the well-being of the tree, and lastly to promote the necessary growth to shelter the fruit or any of the branches from the fierce rays of the sun.

The recognised time to prune generally is when the tree is dormant, that is, when the leaves are off, say, in June, July, and August, and even later if necessary, rather than not prune at all. Summer pruning can be done to great advantage, especially to those trees which are producing wood to the detriment of fruit, when the flow of sap is less vigorous, and a

short time after the fruit is off, but it is impossible to lay down any hard and fast rule. One must be guided by the season, conditions, habits of the tree, and, above all, by careful observation.

To perform this operation just at the right time one can look forward to an increased crop of fruit and less vigorous growth. To do it before or after is waste of labour, as the former would encourage the production of more wood—to be cut out at the winter pruning, and the latter—well, one could do it just as much advantage later when the tree is bare. I shall refer to this again later when we consider how to prune trees that are in bearing.

We will now take the young tree, no matter whether it be Apple, Pear, Apricot, Peach, or Jap. Plum, one year after planting, and commence to lay the foundation of the tree we wish to see in full bearing later on. But before commencing operations with the knife or snips let me sound a note of warning. Do not be in a great hurry to cut, but rather look at the infant tree from all sides, trying to imagine what form you desire this particular tree to take, bearing in mind that it is easy to make or mar by a wrong cut.

We have the three or four shoots retained earlier in the growing season, and should they be in their right places, all we have to do is to cut them back to a third of their length, cutting to an outside bud if the shoot is too upright and to an inside if it has a spreading tendency. Remove any small shoots that may be on the length of shoot left, and now is the time to cut clean away close to the stem the small shoots that were left to protect it from the sun. From this time the stem should be kept bare of growth below the bottom shoot. All cuts should be painted over with oil paint as at the shortening or cutting back at the time of planting.

We have now arrived at the second year after planting, and we must use more caution before cutting than we did a year ago. Take plenty of time in looking at the tree from all points. It is only practice that will enable you to decide at the first glance which shoot should be cut away or retained.

These remarks will apply to any kind of fruit tree, at any age, until you have gained the experience enabling you to become a rapid pruner.

It is necessary now, at this age, to take each kind of fruit separately; we will therefore start with

The Apricot.

This is a vigorous grower, and we shall find very strong and heavy growth, and unless this growth is reduced to two shoots from each branch retained last year we shall have the tree getting out of hand, and the result will ultimately be a thick bush, where no sun or air can get to ripen the fruit spurs on the main branches, hence the fruit will gradually be borne higher up, until it is in the top of the tree, requiring a ladder to pick what is left after the winds have finished their work. You will all be familiar with the tree with its foliage and fruit some 10 or 12 feet from the ground.

Allow only two shoots to remain on the branch retained last year, as the next branch—and as near equi-distant as possible. Shorten into a third of their length, cutting to an inside or outside bud, as may be required to shape the tree. A few small laterals or spurs well distributed should be retained on last year's growth, and when these are more than about 3 inches long shorten them in to this length.

The third and following years must see the same vigorous thinning out and shortening of the long shoots that are formed, retaining no more than is necessary to form a well-balanced, open tree. Treat the small laterals the same as before shortening in new growth formed on those cut back last

year, and when the fruit spurs are not too crowded, allow all to remain. You want your fruit on these spurs and laterals where it will be well sheltered from the sun and wind and will be easily gathered, where it will obtain the greatest flow of sap. You will get it here, and it will be fine fruit.

Apple.

Allow only two shoots to remain on the branch retained last year, as mentioned under Apricot, shorten these into one-third of their length, cut all others clean away, allow all short laterals, if not too crowded, to remain if under 6 inches in length, otherwise shorten them into this length. The main object is to induce the formation of fruit spurs, balance the tree, keep it fairly open, keep the laterals shortened in up to the third pruning, cut out all cross branches, and afterwards thin the top shoots to one, and do not head back. After the tree is in bearing a judicious shortening in and cutting back may be started again. By this time the habits of the tree will be known to you, and you will be guided as to whether it is necessary to open the tree more to ripen and give colour to the fruit or shelter it from the sun.

Pear.

We shall generally find a much thicker growth than in the apple, but the same process of thinning out must be done. Cut back the shoots to be retained to half their length and the laterals to about 8 inches. Continue the thinning out and cutting back of the tops and shorten in laterals. The main object is to keep the tree open to allow the fruit spurs to ripen. Thin out the inside shoots of upright growers to force the growth outwards, and *vice versa* if the tree is too spreading.

Peach.

At this stage of this tree the formation must be continued, but as it bears in the third year after planting, we must keep in mind that the following year will bring us fruit. This will be recognised by the treble buds on the new wood, and our object must be to promote the growth of new wood by constant thinning out and judicious shortening in. Many varieties of the peach have a way of bearing a heavy crop one year and none, or very few, the next. I have lately adopted the plan recommended to me of pruning Peach trees as late as after the fruit is set. You can then regulate your crop and considerably lessen the labour in thinning out. Continue thinning out overcrowded branches, but discontinue shortening in to any extent after the third year. Try the pruning after the fruit is set, and be guided by the result. Remove all dead wood spurs, etc.

Japanese Plum.

This on the Peach stock is a rampant grower, and must be kept in order constantly. Keep the tree open of upright growers, such as the Wickson and Kelsey, and thin the growth of the spreading varieties inwards. The Burbank is, to say the least of it, an ugly grower, throwing its growth at all angles but the one that is wanted. By cutting back and thinning out you will find the fruit studded each year right along the main branches. There is no difficulty in producing fruit. It comes in abundance, so do not be afraid of pruning.

SUMMER PRUNING.

When to do this has been already referred to. How to do it and what fruit trees to operate on I will endeavour to explain. Apricot, Pear, and Apple trees, according to the variety and their growth, give good results if the new top growth is thinned out to allow the sun to penetrate the centre of the tree, more freely to ripen the fruit spurs and laterals. The latter should be carefully shortened in at the same time. The Japanese Plum is such a prolific bearer that summer pruning is not required. The Peach, carrying fruit as it does on its new wood, had also better be left alone at this time of the year, except to cut clean away the many water shoots. This may really be done at any time during the year, and it is as well to do it from time to time to keep the tree open.

Some of the points to be remembered under this heading are: When you cut back a tree at planting it is to throw the growth into the roots so that they may increase in quantity and strength. And at any pruning afterwards the same will be the result. The more you cut the greater and stronger the roots and the top growth. Knowing this, it is obvious that the object in heavy pruning when the tree is young is to make a large, strong, and healthy tree by the time it reaches the bearing age.

DISEASES AND PESTS.

You will have listened to an expert (I refer to Mr. Dewar) on this latter, if not the former, so I shall only refer to them in a general way from the orchardist's point of view. The greatest pest we have to contend with, particularly in the Eastern Province, is undoubtedly the fruit fly, and, unfortunately, there is no known remedy for its extermination. It is the curse of the fruit-grower. The only means I know of to keep it somewhat in check is to have all fallen fruit picked up each morning, place it in water for twenty-four hours, and then fed to the pigs. By doing this we have the satisfaction of knowing that we are at least destroying a great number.

The experiments with the poisoned bait (arsenate of lead and treacle) which have been carried out at Sunnyside the last two seasons have been considerably interfered with by rain, so, unfortunately, they are of little use at this stage. The paraffine remedy recommended from Australia should be tried by all fruit-growers, big or small, and if it only kills—as it is stated it does—and the traps are set early in the season to kill the early fly, we may harvest a good late crop of Apricots and Peaches. The American blight (Woolly aphis) is also very destructive, but, fortunately, there is a remedy for this in the shape of spraying when it is confined to the tops of the trees, but there is no known remedy to get rid of it from the roots, other than the destruction of the tree. The introduction of the blight-proof stock, Northern Spy, etc., was and is a boon to apple growers, as it is proof against this insect, and when the roots are immune it is only a matter of spraying to keep this pest down. The many fungus diseases, although troublesome, may be kept under by spraying with Bordeaux Mixture, or Soda Bordeaux, which is more easily mixed and, from my experience, is equally as effective.

It may be well to mention at this stage that no one growing fruit should fail to spray his trees for fungus diseases and pests. The outfit, material, and time taken over the operation is not a serious item, and growers large or small will find it money, time, and labour well spent. It is hoped by large growers that Government will pass an Act of Parliament making it compulsory to spray, etc. This was recommended by the Combined Eastern and Western Fruit Growers' Congress held last May.

FRUIT.

Having given the trees the care and attention they require, in the shape of careful and systematic pruning, spraying, cultivation, etc., we can reasonably look to harvesting a payable crop in due season, and preparation must be made beforehand to handle it. Our picking boxes or trays, boxes for packing, must be ready and our agents at the different centres of consumption arranged with.

Up to the present time we have been assisting Nature to give us the reward for our labours, but at this stage we are entirely in her hands, and if continuous rains and late frosts come at the time of blossoming we shall suffer.

THINNING.

Presuming Nature has been kind and we have a good crop, when the fruit is about the size of small marbles it is time to thin out, so that the tree may not be overtaxed, the fruit evenly divided, and given the opportunity of fully developing. Japanese Plums and Peaches, as already stated, are heavy bearers, and they will not give large fruit unless they are well thinned.

The object of thinning out is to give us large fruit, prevent the tree from over-bearing, and to assist in insuring regular crops each year.

The pruning advocated having been faithfully done, and other conditions named are favourable, we shall find the fruit low down, well sheltered from sun and wind, and easily gathered. It is here where we want it, and have aimed all along to get it, and where we must have it each year.

PICKING.

We must be guided by the kind and variety of the fruit, more or less conditions of season, and the distance of our markets to decide at what stage of ripeness the fruit should be picked. No hard and fast rule can be made, but experience will teach us by careful observations, the constant testing—noting at the time the colour and flavour—and being informed by the agents at the different centres as to the condition the fruit arrives. The nearer your market, the longer it may remain on the trees. This will apply to stone fruit in particular.

With Apples and Pears one has more or less a guide when to pick, and there again one is often misled, as some varieties of both kinds of fruit require to be left on the trees after the sign is given to obtain the best results. It will, however, be fairly safe until we have gained experience to pick Apples when the seeds are brown in the fully matured fruit, and Pears in the same condition, and when they will come off by gently pressing them upwards. To gain your experience cheaply and quickly visit as often as you can some orchards—before your trees come into bearing at about the picking time—and note at what stage the owner harvests the various kinds and varieties, and, if possible, obtain a sample of each, maturing, and eating it. This will be of great assistance.

It is seldom, if ever, one can pick all the fruit from one tree at one time. It will be necessary to select those ready from time to time.

Having decided to start picking, and having inexperienced hands to do it, one is handicapped, but the difficulty will be overcome by keeping a close watch on the pickers, and showing them what to pick and what to leave when they are not satisfactorily doing their work. When you are picking choice fruit use a shallow box, with some wood wool in the bottom, and allow only one layer to be put in, but if for factory, a deeper box,

holding about 40 lbs., can be used. Do not allow any fruit that falls from the hands of the pickers to be put in the box when it is intended for packing. A picker will often pick up a fine fruit after carelessly allowing it to drop, and the bruise being fresh, will often escape the grader's notice. No fruit after it is picked must be exposed to the sun. Have the boxes as they are filled placed immediately under the shade of the trees near at hand. As much of the crop should be picked in the early morning, and never while it is wet, unless it is for immediate use in the factory.

Grading.

The grading—and this should embrace selecting the sound fruit also—should be done in the packing house. No fruit with a blemish should be passed on to the packer. As a rule—if you have a factory willing to take fruit, and crops are good generally—two sizes only should be graded as table fruit, but if you are fortunate enough to have a good crop and others only a poor one, it may pay to pack three sizes. But bear in mind that your main object is to establish your brand as covering the best, and only the best, fruit, so that you may create a demand.

The fruit boxes one can now obtain from Sweden and elsewhere are cheap, and most suitable for packing table fruit in, and if you have your brand and name printed on (I strongly advise you to do this), they make a neat and attractive package.

The grading and discarding of unsound and marked fruit must be done carefully and honestly, bearing in mind that in the long run you will be the sufferer if any inferior or undersized fruit is included in the good and selected large size. Grade into a shallow box the different sizes to be packed, and pass on to the girls that are packing.

Packing.

If it can be arranged, let one or more packers continue packing the one grade. You will find this way more expeditious and satisfactory.

For long distances and the largest fruit, wrap each in tissue paper and pack tightly in wood wool. For short distances and the smaller fruit, pack in wood wool only. The main object to be kept in view is honest grading, firm packing, and to make the whole package—inside and out—look as attractive as it is possible to make it. The quality and name of the contents of each box should be neatly stencilled on each box. It is necessary through all the stages, from picking to placing on the different markets, that the fruit should be kept as cool as possible. The boxes are now nailed up, after seeing that there is sufficient packing to prevent the fruit from moving its position.

The following are some of the hints to always remember, viz.:—Choose the best kinds and varieties that you think will do well with you, and the best grown, healthy tree. Give nothing but the best attention to them and the soil at all stages. Carefully pick, select, grade, and pack, and you will obtain the best price when you sell. Think of the word BEST in capital letters.

Before closing my remarks, we must not forget our great friend the Bee. Encourage him at all times to stay with us, as it is absolutely necessary that his services are obtained to fertilise the blossoms. I will not go into the ways and means of keeping bees; suffice that it will pay you to have many hives of them, and to give them care and attention. You will be rewarded not only in the way already indicated, but the honey they produce will repay any money you may lay out.

In my introductory remarks I stated that it was impossible to give in the time at my disposal anything but a skeleton of what a fruit lecture, or rather lectures—these should be many and long—should be, but if you have followed my remarks, noted my illustrations, and will continue the subject with me at Sunnyside this afternoon, you will have at least obtained sufficient insight into this interesting study to urge you to read, practise, and qualify yourselves to take the industry seriously in hand.

Before concluding my remarks, I will endeavour by illustrations to give you a good idea of what I consider the shape of a six-year-old tree should be. Allowances must be made for the crude drawing. The general outline will, however, be fairly correct, and you will readily grasp the why and wherefore of this shaped tree. You will observe that the lower branches are high enough to allow the plough or cultivator to get near to the trunk, which, as already stated, is a great consideration—hand labour to be avoided when the machine can do it.

The fruit is low enough to be picked easily and cheaply. Is protected from wind and sun, and the trees in the orchard generally have the appearance of having been well and carefully trained. When a man looks upon such an orchard as being the work of his hands and brains, he may well feel proud and satisfied that he has done, and done well, his part. Now one last word. You are the men who are to push this country along. You are young, eager, and can well spare some time to experiment—make them whenever you can in the interests of yourselves and your country.

I shall expect all to come to Sunnyside this afternoon, as you will there have demonstrated many points. Good points to follow and bad ones to avoid, but both should be well noted. I thank you for the patient and attentive hearing you have given me, and trust that although this lecture must under the circumstances be very incomplete, that it will bring forward as good fruit in due season as that I recommend you to grow.

VINE MILDEW—PLASMOPARA VITICOLA.

PAARL FARMERS' ASSOCIATION AND THE REGULATIONS.

INTERESTING MEMORANDUM BY THE GOVERNMENT ENTOMOLOGIST.

The Secretary of the Paarl Farmers' Association (Mr. James Gribble) forwarded to the Department of Agriculture on the 8th ult. the following communication:—

REGULATIONS FOR THE PREVENTION OF THE SPREAD OF THE DISEASE KNOWN AS "PLASMOPARA," AND TO PREVENT ITS INTRODUCTION INTO THE WESTERN DISTRICTS OF THIS COLONY.

The Acting Under Secretary for Agriculture.

Sir,—I have the honour to inform you with reference to the above—and in reply to yours B/5201/C/33, dated 15th August, C/2982/C/33, dated 13th ultimo, C/3133//C/33, dated 21st ultimo—that my Association, having fully discussed the subject at the last monthly meeting (24th ultimo), appointed a Committee of nine members, representative of the whole district, to carry out its wishes, to go further into the matter, and to take any action necessary.

The Committee having met, took the views of those present who had had practical experience in combating the disease in other countries, and of the local delegates who had examined the infected areas at Grahamstown, and having carefully gone into the whole question, have instructed me to write as follows:—

To enquire from your Department,

(1) What was the information on the strength of which the regulations (252/07) dated 21st May, 1907, were modified?

(2) Further whether the parties supplying it are in a position to state that the resting spore of the disease can be destroyed by the treatment recommended in the regulations now in force?

The Committee resolved—that it is in the true interests of all concerned

That (*a*) your Department should at once withdraw the present regulations, and to promulgate those contained in No. 252/07—leaving out the whole of the latter portion of paragraph 1 of that schedule—commencing with "and no vines."

(*b*) That a new regulation be added to the effect "That as soon as practicable only boxes shall be used in which fruit may be packed for conveyance over the Colonial Railways from places in the Western Province to those beyond De Aar Station and that no empty fruit packages shall be allowed to be sent from places north of De Aar Station to the Western Province.

(c) That in the meanwhile (whilst the present regulations are in force) provision be made for disinfecting all returned empties from the North for the Western Province and also the trucks employed for the conveyance of Eastern Province produce—at some convenient centre, say at De Aar Station. And not with the preparation as given in the present regulations as this preparation will discolour and destroy the fruit baskets besides adding a bad taste to the fruit packed therein afterwards and because the Committee does not consider that preparation fully effective in destroying the spores of the disease—but that means be adopted to place empty returns in a sterilising chamber and subject them to a heavy pressure of steam *or* the fumes of burning sulphur.

The Committee wishes me to add—*most emphatically*—that in view of the facts placed before them regarding this disease that in their opinion the present regulations are not likely to serve any good purpose either to the Farmers or Nurserymen of the Eastern Province nor the Viticulturists of the Western Province and they regret that your Department by modifying the Regulations 252/07 has jeopardised the principal industry of the Western Province Farmers—one which represents a vast outlay of capital and which in a large number of cases is the only asset of that community and the sole means of livelihood on which many of them depend, and which in the present state of their markets and after the great expense they have gone to in re-constructing their vineyards they can ill afford to risk.

The Committee feels most strongly that the risk of introducing this disease into the Western Province as proved in Algiers with similar climatic conditions is no imaginary one, and that it is the duty of your Department to take steps not with the idea of allaying apprehensions, but to prevent its spreading further by every means possible and to protect to the fullest an industry which has so much at stake The Peronosporaceæ, as your Department is aware, is one of the worst plagues farmers elsewhere have to contend with, its ravages in the Western Province potato crop are well known, and if unfortunately the vines in the Western Province should be attacked by that fungi—the Viticulturists in those parts will never be able to eradicate it, and it will lead to an insufferable burden in the extra expense necessary for spraying—a means which can only be partly successful in efforts to keep it down. The export trade in grapes and other fruit will be seriously affected and the making of wines handicapped, and in seasons when the conditions are favourable for the rapid development of the spores of that disease practically the whole of the grape crop would be lost.

The Committee does not take up the position that the Regulations desired or any would be sufficiently effective to prevent the introduction of that disease into the Western Province—but at the same time they submit that the spreading of the disease can be retarded as proven by the Phylloxera restrictions, by means of which the Constantia and other districts were kept clean for several years.

The Committee in view of evidence placed before them cannot for one moment admit that the disease (plasmopara) had existed in this Colony for a number of years.

With reference to the vines which were forwarded to certain Western districts last year from Graaff-Reinet—the Committee deem that if it has not already been done that your Department should at once adopt measures to have such vines destroyed, and the sites upon which they were planted fumigated and quarantined—as the risk is too great in waiting to see whether any spores upon such may develop. It may be too late afterwards.

In your reply dated 21st ultimo, the Committee cannot reconcile your Department simply making provision against areas one quarter of a mile from any vitaceæ within the proclaimed boundaries—when your Depart-

ment admits that the disease has spread over an area of 25,000 square miles—for if the latter is the case then practically the whole of the Eastern Province is infected—and as your Department admits that the disease can be spread by such agencies as wind, human beings, all produce, etc., then the present regulations with regard to certificates and the quarter mile radius are not worth the paper they are printed upon. Especially in view of the fact that such certificates are in many cases very much open to question even should your Department at great expense make provision to carry out the regulations affecting certificates.

The Committee would remind your Department that the Western Province Fruit Growers at much loss and inconvenience to themselves have co-operated with those of the Eastern Province in special provisions made to protect the latter from "Codling moth" and respectfully but firmly submit that on a question which threatens the very existence of their industry, that the Viticulturists of the Western Province have a right to expect that your Department should not have modified regulations 252/07 regarding Plasmopara Restrictions—as the likely loss through the latter to the Eastern Province Farmers and Nurserymen is not for one moment to be compared with what the Western Province Viticulturists might suffer.

The Committee would point out to your Department that whilst the restrictions regarding the Phylloxera were in force that the whole of certain Western Province districts were quarantined and others protected—and it was then impossible to forward certain products from the one district or to forward any to the other. The losses thus entailed upon the districts concerned were so great that every farm was decreased in value and many of the farmers were made insolvent. If therefore in view of the representations made to your Department Plasmopara should find its way into the Western Districts through the modified restrictions, your Department will have much to answer for—for the results in these districts will be far more appalling than that during the Phylloxera period. And seeing that this new disease first made its appearance in the Eastern Province, the Viticulturists of the West—after what they have suffered—have a right to expect that only such restrictions shall be made as will safeguard them in that direction. And the Committee regrets to add that they cannot agree with the Secretary for Agriculture in the position he has taken up in the matter.

And as the matter is of such vital importance to the whole of the Western Province, the Committee requests that the views and wishes herein expressed shall be brought to the immediate attention of the Secretary for Agriculture—and that the portions requiring expert advice shall be referred to one in whom these Viticulturists have confidence.—Yours, etc.,

(Sgd.) JAMES GRIBBLE,
Secretary.

Paarl, C.C., October 8, 1907.

The Acting Under Secretary for Agriculture, in reply to the above, pointed out that the result of the inspections made by three officers of this Department led to the conclusions mentioned in the letter No. C/2982/C33 of the 13th September last, and that Government framed the present regulations only after fully discussing these conclusions with representatives of the Boards of Horticulture, Professor Hahn, Dr. Schönland, the Eastern Province Entomologist, and the Manager of the Government Wine Farm, Groot Constantia.

The Committee's recommendations in the above letter with regard to the destruction of the vines from Graaff-Reinet has received the attention of the Government, but as this importation took place during the year 1906 any infection which might have been caused thereby would have taken place ere this, and there is therefore no necessity to take the drastic steps now suggested.

As regards the point raised as to a "quarter mile radius," the Acting Under Secretary points out that a perusal of the Regulations of this Colony will show that they contain no reference to a "quarter mile radius," this restriction being imposed under the Regulations promulgated by the Transvaal Government. The other points mentioned are fully dealt with in the accompanying memorandum, drawn up by the Government Entomologist, which was transmitted for the information of the Association:—

MEMORANDUM BY THE GOVERNMENT ENTOMOLOGIST.

The Acting Under Secretary for Agriculture.

There are two distinct groups of subjects to the Plasmopara question as it affects the Western Province at present. One group has to do with the problem of what should be done to retard the spread of the disease; and the other has to do with the importance which the disease is likely to assume in Western vineyards. To report with any degree of satisfaction on the Paarl Farmers' Association Committee's communication and resolutions, it seems desirable that I divide the subject as suggested and treat with greater detail on the first division.

The Winter Spore.

The first thing to consider in scheming what should be done to retard the spread of a pest is through what agencies it, or pests like it, spread naturally. Regarding Plasmopara, we have heard a great deal about the winter spores, yet have seen little discussion of the part these are fitted to play in spreading the disease. Instead it seems to be assumed without much thought that because the winter spores are hardy and long lived that they are greatly to be feared in connection with the dissemination of the disease. But a fair consideration of what is known of the economy of the winter spore and of what is known of the natural spread of this and other fungi leaves it very doubtful that the winter spore is in reality much concerned. The number of winter spores formed is trifling compared with the number of summer spores. Viala, the great French authority on vine diseases, says too that they are more numerous in cold than in warm countries, he having difficulty in finding them in leaves from the Southern United States, whilst he found them numerous in leaves from the Northern States. But however numerous or rare they may be, they are formed within the tissues and escape only with the disintegration of the leaf. Their escape is therefore on or in the ground, in the ground more likely than on it, for the final break-up of leaf tissue which would liberate them in greatest numbers generally takes place beneath the surface. Leaves blown into heaps and compacted into mould must be considered buried except at the top. There is little chance of the spores being carried by the wind, and their greatest chance of being taken from the vicinity of the vines on which they were produced would seem to be in soil purposely or accidentally removed. Their function is clearly to tide over the season when the vine is not in leaf, and they will germinate only after a period of rest and

under conditions involving heat and moisture. It is said that they may survive over a year, and an experiment by Viala showed that they could pass through a sheep without apparent injury.

Development of Winter Spores.

But supposing winter spores are transported uninjured to a distance what is then the chance of vines becoming infected through them? Mycologists disagree on this point. Viala gives a detailed account of the investigations and theories of different authorities in his *Maladies de la Vigne* and I do not know that any discovery of importance on the matter has since been made. Some theorised that on germinating the winter spore formed a stem surmounted by summer spores, and one botanist (Prillieux) claimed to have observed such a development. But except Prillieux all the great authorities mentioned by Viala who studied the point observed that the germination liberated zoospores only. The practical difference is that the formation of summer spores would admit of the infection being borne on the wind, whereas zoospores to produce infection would have to be carried to green parts of the vine in water. Viala even theorised that the restarting of the disease in an infected vineyard after a winter might depend on a newly started vine seedling on the ground first becoming infected by water contact with a germinating winter spore. One such infected seedling, however small it was, could produce summer spores which the wind might carry to a neighbouring vine and thus a vineyard, and speedily the vineyards over a great area, become infected. This shows that he reasoned that a vine is by no means sure of re-infecting itself, and therefore that vines might be taken time and again from an infected area to a clean one without establishing the infection. Indeed, that this is a fact is shown by the length of time that Europe escaped the disease despite of its favourable climate and of large and frequent importations of American vines without precautions to exclude this and other diseases being taken. The disease, be it understood, is native in America. Oidium got to Europe from America thirty years before it did, and phylloxera about ten years before. The winter spore, from these considerations, must be regarded as an unusual medium for spreading the disease; but the fact that there is a chance of its playing such a part, and hence an apparent chance of retarding the spread by restrictions on traffic between infected and clean areas would have greater weight were it not for the extraordinary rapidity with which fungus diseases which may be compared with Plasmopara spread from country to country.

Spread of Plasmopara in Europe.

The presence of Plasmopara in Europe was first determined authoritatively in the autumn of 1878. In 1879 the disease was reported from nearly every part of France and from places in Italy. In 1880 it was north in Germany, south into Spain, Algeria and Sicily, and east over the Alps into Switzerland. In 1881 it was found still further outwards in Hungary, Roumania, Turkey, Greece, and Southern Russia, and west of Spain in Portugal. Thus in three seasons it invaded practically the whole of Europe where vines are extensively cultivated, extending over an area several times as large as the Cape Colony. Scientists did not doubt that the spread was almost wholly independent of human agency; and as it happens the similarly rapid spread of another vine disease, Oidium, appears to show that the summer spores alone were sufficient to account for the dissemination.

Spread of Oidium and other Fungi.

Oidium was recognised on the continent of Europe in 1847, in which year it was found only in greenhouses at one place. In the following year it was found in a number of places in the North of France. In 1850 it turned up in other parts of France, Spain and Italy, and by a year later still it had found its way into all the Mediterranean vine regions from Spain and Algeria eastwards into Asiatic Turkey and Syria. The fungus was closely studied by many scientists, but they found no winter spores. In America winter spores in abundance were found with what was suspected to be the same disease, but down to 1892 when some winter spores were at last found in Europe many botanists doubted that the American and European oidiums were one and the same. It is now recognised that in some parts of America, as in Europe, winter spores are not formed or else are extremely rare. It follows that the spread must be through the summer spore. Potato Blight (*Phytophthora infestans*) is a very close relative to the Plasmopara, but in its case no winter spore has been discovered. Nevertheless, the disease spreads with wonderful rapidity, within five years of its discovery in Europe having invaded practically the whole of the continent. The Asparagus Rust affords another instance of the rapid spread of a fungus, it having crossed the American continent from the Atlantic to the Pacific in five years and worked up the Californian coast in two more over a course nearly four thousand miles in length. The present Plant Pathologist of the University of California, Professor Ralph E. Smith, made a prolonged investigation of the disease in California, and in his admirable report on the subject (Cal. Univ. Bull. 165, 1903) he says: "There appears to be but one mode of distribution at all common which is the distribution of uredospores (summer spores) by the wind. Locally no doubt other agencies come in. Birds, animals, and workmen, passing about the fields, very likely hasten the progress of the parasite somewhat, although without such aid but little difference would be seen in the rate of progress of the disease. That the rust is carried long distances, as from State to State or from the East to California, by means of seeds, roots, or traffic of any sort is extremely doubtful. The progress of the disease has been too regular to be accounted for in this way. Asparagus seed and roots were imported from the East to various parts of California during the entire rust epidemic there, yet the disease came up gradually from south to north at the conclusion of its seven year steady journey from the Atlantic, with no indication of starting here and there in the State, as would be the case if brought in on roots and seed, and also not appearing any sooner at the places where eastern importations were planted than at all the other places in the same region. All the indications go to show that the rust has been a most independent traveller, requiring no aid from man to carry it on its way." A peculiar feature of the spread of Asparagus Rust in California is that it was *against* the prevailing winds. This fact is also of interest to us in connection with the Plasmopara. Smith believes the fact to be due to the prevailing winds being too strong and dry for the endurance of the spores; and he theorised that the infection travelled on damp slow moving currents that blow before the prevailing winds rise in the morning.

Risks with Imported Produce.

Some may say that they are prepared to admit that wind borne summer spores are responsible in the main for the spread of Plasmopara and that the disease is certain to reach its natural limit of spread in the Colony by this means, and yet still hold that until the Western Province is found infected the Government should take the precautionary measures advocated

by the Paarl Farmers' Association Committee, namely, to exclude all produce grown in the known infected area, and have baskets, trucks, etc., returned from beyond De Aar disinfected by steam under pressure or by sulphur fumes, pending arrangements to do away with the return of empties from beyond the point named. Therefore I am impelled to advance still further arguments to show that such steps would not be justified. It seems not to have been considered that the Western Province has been importing produce of various sorts from the infected areas of Europe and other countries continuously. Until within a few years vines and grapes were the only things excluded in the plant line, and this exclusion was not applied to *Ampelopsis*. Right along seeds of divers kinds, bulbs in large quantities, thousands of cases of seed potatoes, tens of thousands of fruit tree stocks, and various ornamental plants in large numbers have come annually from Holland, France, or other continental countries ravaged by this disease. Some soil comes with these things unavoidably. Is it above suspicion? And how about the moss and leaf mould in which the plants are packed? We have taken lucerne from the Argentine and grain from America, other infected countries. Mediterranean citrus fruits have long come into our markets. Our wine farmers of late have bought much French fustage and other wine supplies from Europe and taken them to their cellars. Wines and brandies from France and Germany have been freely imported. If the Paarl Committee thinks that danger may lurk in a basket that has been beyond De Aar, surely it must suspect that the dreaded winter spore might be harboured in the straw wrappers and in the cases in which these European wines and brandies come? In almost any grocery store in the larger towns of the Western Province one can buy Spanish raisins and Grecian currants. Is it quite certain that these were not dried in or close to infected vineyards when we know that Europe is so generally infected? Apples to the extent of thousands of barrels annually have of late come from Canada and parts of the States where vines grow wild and where Plasmopara not only flourishes but forms winter spores abundantly. Are these fruits less dangerous than Eastern Province pines and oranges? Article for article, I believe that plants and fruits from Europe, the Eastern States of America, and from many of the provinces of Argentina are quite as likely to be the means of establishing the disease in a new place as the produce of our infected districts. However, except as regards plants of the vine family and grapes, I am of the opinion that the risks involved are too remote to warrant action. And if we continue to take chances with foreign produce, why not take them with our own? After all they are only such risks as every civilised country must take in connection with innumerable pests and diseases, for there is a limit to the restrictions which it is wise to place on traffic and it is only rarely that the restrictions which may reasonably be imposed are theoretically perfect for their purpose. As a rule it is profitable to give attention to the direct danger only, which in the present case is the introduction of vines and grapes.

Infected Area not Definable.

One further feature of the Plasmopara problem deserves consideration in deciding what steps to retard the spread are justified. This is the impossibility of determining the limits of the area within which the disease now occurs in South Africa. The complete dependence of the disease on the simultaneous occurrence of heat and moisture to accomplish its spread has been pointed out so often by others at the Cape during the past year that there is now no need for me to dwell at length upon it. I wish, however, to emphasise the fact that until there are favourable conditions in a place and the disease consequently develops, the most skilled mycologist would fail to find the disease on the new growth of a vine in a locality where it was

widely prevalent and severe a season before. Also I wish to lay stress on the fact that the disease may occur in a place and fail to attract any attention on the part of the vine growers for the reason that it may be doing no appreciable damage, or if it is doing damage that they ascribe the injury to other causes or are indifferent to it. What I wish to show is that the infection may be spread over a far greater extent of country than is now known to be infected. We know it in most places where is has been found only through its having been specially searched for in those parts. As an illustration the circumstances of its discovery at Graaff-Reinet may be cited. The Eastern Province Entomologist went there in the middle of February specially to look for the disease and failed to find a trace of it. The Manager of the Government Wine Farm was sent on the same errand several weeks later, and was assured on his arrival by several trustworthy parties that the disease had not appeared. Vine culture, it may be mentioned, is an industry of considerable importance at Graaff-Reinet; and naturally after the publication of alarming news paragraphs on the subject and the proclamation of drastic regulations, those interested were on the look-out for the disease. Nevertheless the second inspection disclosed that it was then widespread in the town. It had escaped discovery by the residents by reason of its not having caused appreciable harm.

The Paarl Committee says it cannot for a moment admit that the disease has existed in the Colony for a number of years. My own opinion, based I believe on more complete information than the Committee had to aid it, is quite to the contrary; but in the present absence of definite proof it is only safe to assume that the disease is new. But whether the disease has been in the Colony for one year or a dozen years, the infection had time last season to extend over the summer rainfall area far beyond where the disease was recognised. The climatic conditions favourable to the fungus were unusually prevalent in that part of the country last season. It is quite conceivable that in ordinary seasons the disease will not appear, or if it does appear will wholly escape the notice of the farmers, in the Karoo and high veld districts, and yet have gone over these districts last year to parts far beyond. I would trust vines from Graaff-Reinet or Queenstown now sooner than I would vines from the Transvaal low veld or Natal. If the disease has been in South Africa one year only, the Western Province of the Cape is likely to have escaped infection so far. If it has been here a number of years, it is probable that it has come in time and time again and probably always died out. But, as above said, the only safe course is to assume that the disease is new to the country.

Justifiable Restrictions.

It remains for me to say what steps I think should be taken to guard the western districts against the Plasmopara. Although from what I have said it is evident that I believe that its spread would be influenced little if any by any measure that is being or may be taken, I certainly believe that with the exception of such as it may be advisable for the Government to introduce, no vines or grapes or anything known to contain vine leaves should be brought into the western vine districts from anywhere. This precaution is desirable not only because of Plasmopara. There is little or no excuse for the introduction of vines, and the risk of their bringing disease is too great to be ignored. Further prohibitions or restrictions do not appear to me to be justifiable.

Probable Importance of Plasmopara in Western Districts.

The Paarl Committee views the probable future establishment of Plasmopara in the Western Province in so extremely pessimistic a light that I

deem it desirable to say a little on the optimistic side in this memorandum. The Committee says: "The export trade in grapes and other fruits will be seriously affected and the making of wines handicapped; and in seasons when the conditions are favourable for the rapid development of the spores of the disease, practically the whole of the grape crop will be lost." If this statement were taken seriously by the public it might, in conjunction with my contention that the spread of the disease is beyond human control, influence many farmers to delay further reconstitution of their vineyards on American stocks; and it might seriously affect farm values throughout the vine districts. Fortunately there is abundant evidence that the danger is not nearly so great as the Paarl Committee represents. The disease must have heat and *moisture on the vines* for its spread and this combination of conditions it will rarely find in the dry irrigated vineyards beyond Worcester. That part of the vine area, and it is no small part, must be accounted practically safe from visitation. It has a climate closely comparable with the vine districts of California, in which State the disease is unknown. This immunity of California is of particular interest to us. In connection with it it should be borne in mind that Plasmopara is native in America and that species of vines grow wild in California; also that the European vine has been cultivated in the State since the first Spanish settlements were made. Thus the disease has had centuries to work into the State and adapt itself to the conditions there if such adaptation were possible. As a matter of fact, the disease was reported present to a slight extent twenty years ago by growers, and one mycologist (now deceased) actually included it in a list of Californian fungi; but the present day vine experts and mycologists have never come across the fungus in the State and doubt the correctness of the old references. I made special enquiry about the disease when visiting the State a few months ago, and obtained the views in writing of Professor R. E. Smith, the leading plant disease authority in the State. His name has been given in connection with Asparagus Rust above. Regarding the Plasmopara he says:

(Copy of letter from R. E. Smith.)

Dear Sir,—Answering your enquiry as to the prevalence of the Downy Mildew of the vine (*Plasmopara viticola*) in California, I would say that, so far as I am aware, this fungus is not known to occur in the vine districts of California. There is not, however, and never has been at any time to my knowledge, any restriction on the introduction of vines from the infected regions of the eastern United States, and I feel certain that infected vines must have been brought into the State and planted times innumerable, without any precaution being taken to prevent the introduction of the disease. The fact that this disease does not occur in the State, or if it does occur that it attracts no attention and causes no appreciable loss, I attribute unhesitatingly to the character of the climate in the vine growing sections. *Plasmopara* is a fungus which requires a large amount of atmospheric moisture for its development, and this condition does not obtain in the vine growing sections during the summer season, that is, when the vine is in leaf and susceptible to the disease.

The moisture requirement is not peculiar to the *Plasmopara*, but is decidedly marked in all the fungi of that class, the Downy Mildews. Two fungi of this order are widespread in this State, Downy Mildews of the Potato and Onion, but affect these crops only when grown in the winter, wet season. When the dry summer comes on their activity ceases abruptly, and even in the same field no trace of the disease is to be seen until the rainy season commences again. These vegetables, being grown in the winter as well as in the summer, afford very instructive object lessons as to the

dependence of the Downy Mildews upon a large amount of atmospheric moisture.

In my opinion you can depend upon the *Plasmopara* of the Vine giving no trouble in South Africa in areas with no rainfall in summer, and from what you tell me of the climatic conditions prevailing in the summer rainfall sections I incline to believe that extensive injury by the disease will be confined to exceptionally wet seasons and low-lying ground.

(Sgd.) RALPH E. SMITH.

To Chas. P. Lounsbury, Esq.,

The Western Province districts nearer the coast than Worcester have not as rainless a summer as the vine sections of California, and it is quite possible that Plasmopara will prove to be able to maintain itself in them. At the same time, outside the Cape Peninsula, it seems very unlikely that damage of consequence will occur unless it be in low-lying or damp and much sheltered vineyards or parts of vineyards. Those on the hillsides are, I believe, as a whole not in any grave danger. The Cape Peninsula has more to fear than the adjoining mainland, and it is quite conceiable (I do not venture to say probable) that in occasional seasons widespread damage may here be done to vineyards not protected by fungicides. The dry south-east wind, however, may be expected to prevent any prolonged outbreak.

My opinions on this matter may carry more weight if I explain that they are not wholly formed from book reading or from a knowledge of the American conditions, but are based to a large extent on the behaviour in the Western Province of fungus diseases which may reasonably be compared with Plasmopara as regards the climatic conditions necessary for their spread and rapid development. The Paarl Committee cites potato disease, saying that "its ravages in the Western Province potato crop is well known." I have not paid special attention to potato diseases, yet time and again have farmers come to me about them and invariably the complaint has been of damage to the *winter* crop, that is the crop grown in the wet season. As in California, I believe the summer crop in the Western Province escapes by reason of the lack of rain, and this despite the fact that potatoes are much planted in vlei lands. With regard to fruit tree diseases I am more at home. Many of these can come on with a much lower temperature than favours Plasmopara, and consequently appear more or less in this part of the country before the spring rains are over. But how little as a whole does the Western Province suffer from them! Wellington farmers know that Shot Hole may spot some of their apricots on certain exposures but few of them find it necessary to spray. In Eastern districts with their summer rain, the disease is much more serious. It is the same with Fusicladium of the pear. This trouble is found throughout the Western Province, and in the early spring shows to a considerable extent in specially susceptible varieties. As summer comes on it practically disappears whilst in more humid countries it then does its greatest damage. With us it requires attention in very few orchards and in these clearly because of exceptional conditions locally. The large commercial orchards are free of it apparently although the infection is all about them in old gardens during the early spring. The Fusicladium of the apple has also been found in the Western Province yet it is very rare. In countries with a humid summer climate it causes extensive damage, and even in the vicinity of Grahamstown it has shown itself capable of spoiling a whole crop. Altogether the pessimism of the Paarl Committee seems unwarranted.

CHAS. P. LOUNSBURY,
Government Entomologist.

SLUITS: THEIR EVIL AND PREVENTION.

[By F. E. Kanthack, Director of Irrigation.]

Under the above heading, a Memorandum by Mr. W. B. Gordon, late Director of Irrigation, was published for general information in November, 1904; all persons interested in the subject and desirous of affording any information on the points raised, being invited to communicate their views to the Civil Commissioner or Resident Magistrate of their District.

In order to focus the opinions given, certain heads were enumerated in this Memorandum under which information was sought and suggestions invited with regard to the evil of "sluiting," its extent, causes, effects, and its possible remedy.

In dealing with the evidence submitted, Mr. Gordon's general synopsis will be adhered to.

A very considerable mass of correspondence has come to hand in reply to the call for opinions, but it cannot be said that many new ideas under any of the main sub-heads have come to light. Generally speaking, each opinion agrees with most of the clauses in the memorandum. Correspondents go into a certain amount of detail regarding a particular cause of sluits, or a particular method of building dams or obstructions, and there is a certain amount of criticism of causes, effects or remedies as indicated in the memorandum. As might be expected, the greater part of the correspondence is a constant repetition of statements echoing the leading points of the memorandum, and valuable as the statements are in strengthening the evidence on various points, yet no useful purpose can be served by alluding to each one separately. A few selected opinions are given as extracts, or in full where a particular factor has been well illustrated, or where a new one has been introduced.

The memorandum was sent to every district in the Colony, but from many no replies of any kind have been received, and generally Field Cornets have submitted reports in response to the Civil Commissioners' directions. Field Cornets are nearly always practical farmers, or men in close touch with farmers, and fully acquainted with local conditions. Before making his report, the Field Cornet generally discussed the matter with the farmers of his Ward, and his statements may be taken to reflect the general ideas of his Ward. Of spontaneous communications, however, by farmers who have thought the matter out and can base their statements on actual experience, there are unfortunately few, though most of those have taken considerable trouble over the matter.

The "Karroo," as a whole, is the area most affected by sluiting, but the response from this great tract is disappointing. Of course much of the back country is inhabited by farmers who cannot be expected to advance this cause by letter writing; but, even allowing for this factor, the great indifference shown by the Karroo farmer in this matter indicates that the majority of the landowners do not in the least realise the gravity of the situation. The greater number of districts from which replies have been

received are in the Transkeian Territories, or consist of sour veld land, and in those parts of the Colony the evil effects of sluiting are relatively small. The whole question is one of great magnitude, and requires individual effort rather than legislation.

Government must above all take the lead, and show its sincerity in the cause by doing its utmost to check sluiting on State lands where caused by roads and railways, and the same applies to all public bodies such as Divisional Councils. Legislation, if necessary, must be reasonable, and not press too heavily on the people, and finally the methods proposed for the mitigation of the evil must be of the simplest kind and inexpensive. Elaborate and costly remedial measures will frighten most farmers into doing nothing at all.

Extent to Which Sluiting Has Taken Place. Section I. of the Memorandum.

(1) Extent to which sluits have been formed in the various districts or river basins, and the previous sizes of sluits and river channels compared with their present dimensions, so far as can be gathered from old reports, maps, and surveys, from the evidence of the older inhabitants, and from reliable information handed down by their predecessors.

A considerable mass of vague evidence has been given under this head, most of the correspondents describing the formation of new sluits, or the enlargement of old ones, within recent years. The chief example of rivers having formed within the memory of the present and past generation are the following:—

The Ongers or Brak River, Britstown District. Some 60 years ago there was no Brak River. The country was thickly clothed with grass and bush. There were no roads and few sheep tracks, and no bare patches of burnt veld on the mountain slopes. The course of the river lies through the "pan veld," and consisted then of a series of extensive flats covered with thick vlei grass alternating with reed-bordered pools. There are numerous very extensive flats, still called vleis, on this river, one of the most valuable being the Tygerpoort Vlei. To-day the river channel through this vlei is generally 300 feet wide and 15 feet deep, and only a very extraordinary flood overflows the banks and inundates the lands.

The Big Brak, Thebus, and Little Brak rivers in the Steynsburg, Middelburg and Cradock districts, tell the same tale. Mr. J. Collett, of "Riet Vlei," states that the Little Brak River, which is now 90 feet wide and 30 feet deep, has come into existence within the memory of men now living.

Mr. E. T. Gilfillan states that what is now the Big Brak and Thebus rivers was formerly a great continuous vlei of grass and vlei reeds with a series of water-holes connected by a small stream of running water on the surface. The river is now 150 feet wide and 15 feet deep, and the vlei grass has disappeared, its place being taken by ordinary karroo bushes. Parts of the Sundays River were formerly in the same condition as is indicated by such farm names as Reed River, Riet Vlei, Palmietfontein. No such plants are now to be seen.

Portions of the Zak River in the Calvinia district, where flood irrigation is not practised, provide another example: at Onderste Doorns, 20 years ago, the leaders of a span of oxen would top one bank before the waggon was half-way down the other. The channel is now 120 feet wide, and carries 12 feet depth of water in flood.

Such examples could be multiplied indefinitely. Every farmer can testify to the formation or enlargement of large sluits, dongas and rivers; and the innumerable reference to big game, such as Oliphants, Rhenoster and Seacow, and to aquatic or marsh plants in the old names of rivers and

farms in the Colony corroborates the pictures and description of the vleis given by early travellers.

The main rivers of the Colony which drain the Karoo are very old, and their history is very complicated and imperfectly understood. There have been, apparently, two or three periods of base levelling, coupled with several elevations and sinkings of the great South African plain. These geological features are set forth in Professor Ernest H. L. Schwartz's article on the rivers of Cape Colony, in the *Geographical Journal* for March, 1906. All land areas go through a cycle of erosion, of which there are three stages. The first, a recently elevated and undenuded plain; the second, the roughening of the surface by drainage water cutting out valleys and leaving ridges and hills, and finally, the complete base levelling of the area. The cycle begins with valley development which, in the initial stages, are ravines or sluits with steep sides and narrow bottoms. They then gradually cut deeper and their heads cut steadily backwards. As valleys approach base level they develop flats, and a state of erosion is reached, when little of the upland surface remains. The process of valley development is very complex, and the history of valleys is subject to many accidents which tend often to obscure the cycle of erosion. In South Africa this process has gone on for ages, since the last upheaval of the Karroo to the 4,000-foot plane, and the numerous wonderful poorts by which the Karroo rivers pass through the great folded belt (such as the Gamka, Seven Weeks, Schoeman's, Meiring's and many others well known), show clearly that before civilised man came into the country enormous volumes of water passed to the sea. The great point is that the progress of erosion is now very much greater than a century ago, and the ideal to aim at is to maintain and even enrich the soil on all flat or gently sloping ground. The high and rugged hills and steeply sloping ground, when bare of strong vegetation, offer insuperable obstacles to the prevention of erosion; but the products of erosion are of great value and should be arrested as soon as the slope becomes easy enough to make this feasible at a reasonable cost.

I have gone into these general principles at some length, as I think it necessary to reduce the sphere of action down to the smallest limits.

In the second clause of the memorandum it is asked whether it is thought that the process of sluiting is still in progress, or whether it has reached its limit. Naturally every correspondent has stated that it has not reached its limit. There can be no real limit to sluiting till the base level is reached. Vigorous action by landowners and the State can only hope to reduce the rate at which sluiting is progressing. Under existing conditions the present rate will increase until the country is reduced to the miserable condition of Sinai, Palestine, and other now arid but formerly prosperous countries. When that stage is reached denudation must keep pace with the lossening of rock material by weathering.

In the sequel the term sluiting will be understood to mean the rapid erosion and carriage to the sea of fertile soil from the flats and gentle slopes of the hills, but does not include the erosion of the steeper sides and mountain heights.

CAUSES OF SLUITING. SECTION II. OF THE MEMORANDUM.

Mr. Gordon enumerated six causes of sluiting, viz.:—

(1) The destruction of forests, trees, and shrubs by fire or otherwise.
(2) The practice of grass bruning.
(3) Overstocking.
(4) The formation of sheep and cattle tracks, especially in the directions converging towards kraals or watering places.
(5) The formation of roads and construction of railways.
(6) Herding of sheep and cattle.

The above list appears to be more or less complete, so far as popular opinion can help us. Of course, all six causes have rarely acted in one and the same place, and this accounts for some correspondents affirming that certain of the causes enumerated had not contributed to the evil. Thus in many parts of the Karroo veld-burning is not practised, and in humid districts like the Transkei bad roads appear to be the only obvious cause. Taking the Colony as a whole, different writers have given ample testimony to each of the six causes in turn. Generally correspondents write at some length regarding a particular cause which appealed to them.

Cause (1). The destruction of forests, etc.—There is very little positive evidence in support of this cause. It is, of course, understood to refer to forests, trees or high bush, which bind the soil together and by the production of humus encourage rich undergrowth, the combined vegetation then acting as a natural reservoir. Mr. J. Sim, District Forest Officer, King William's Town, says in his article in the *Agricultural Journal* for September, 1904: "A few years ago trees, or at least shrubby plants, were plentiful on ground which is now nothing but a series of sluits. All trees, shrubs and bushes have been cut down, and this custom is still going on wherever a few Vetboom or Besom-bosche are to be found, until nothing that could act as a deterrent is left."

Cause (2). Grass Burning.—This practice is mainly confined to the sour veld tracts, and to such portions of the Karroo where grass veld exists. In the remainder of the Karroo burning is now practised only to a very small extent. In the humid sour veld the practice is universal, and is evidently a fruitful cause of sluiting; but, as already stated, the evil is not so obvious in these parts, and grass-burning is not admitted to be a cause. Unfortunately no replies have been received from the dry grass veld districts, where burning must have a very bad effect. Mr. W. Southey refers to it as a pernicious practice, but states that it is absolutely necessary in some parts, as sheep will not thrive in long grass.

The burning of the veld is an ancient practice. The old Portuguese navigators noticed the bush fires on the South Coast of the Colony as they sailed by. It is possible that the pasture has deteriorated by this practice, but it is almost certain that springs are lessened for high grass, and especially the reeds and other bog plants in the valleys (which form excellent temporary storage reservoirs), are destroyed. I was interested to learn recently that veld burning, once common in certain parts of Europe, had been entirely stopped by drastic legislation for much the same reason as would apply to South Africa.

It will be convenient to deal with causes 3, 4 and 6 together, and in the reverse order, viz.:—

(6) Herding of sheep and cattle.
(4) The formation of sheep and cattle tracks, especially in directions converging towards kraals or watering places.
(3) Overstocking.

The herding and kraaling of stock is due to the danger from carnivora, mainly jackals, and there is a great deal of truth in the statement made by Mr. B. G. Hobson's letter (Jansenville) that sluiting is due to jackals. The presence of wild animals has necessitated herding and kraaling; which has, in turn, caused overstocking of small areas, trampling of the veld and loosening of the soil, and needless moving about of the stock to bring them into the kraal at night or to watering places. The scarcity of water in times of drought, or the want of a sufficient number of drinking places for stock, is a cause which most correspondents admit. During times of drought I have heard of stock having to travel daily enormous distances to get water. The dry veld at such times quickly becomes trampled into dust, and the habit which large stock have of travelling to their water in single file aggravates

the evil by causing the formation of a deep and dusty foot path. Isolated heavy thunder showers falling at such times cause enormous quantities of dusty soil to be washed away into the rivers. Mr. Olivier, of Kweekwa, Victoria West, considers that one watering place should be provided for every 1,500 to 2,000 morgen.

Overstocking is chiefly due to great concentration of stock on a particular good piece of veld and to the enormous difference in the grazing power of the veld in good and bad seasons. During the past drought the whole country was overstocked, but this trouble is impossible to guard against. Even with the advance in the production of irrigated foodstuffs, a bad drought following on a series of good years will always find the country overstocked.

Mr. Forbes C. Ainslie, of Fort Beaufort Division, states that the farms on the sources of the Kat River were formerly Government reserves, and formed a succession of vleis and bogs. Twenty-five years of overstocking has caused these vleis to disappear, thus causing the supply in the Kat River to diminish. A few correspondents attribute considerable damage to overstocking with ostriches.

The direction taken by stock to their kraals or to the watering places, with reference to the slope of the country, is of great importance in this connection. Stock moving in the direction of the drainage tends to sluiting; whereas, their moving transversely to the direction of the drainage tends to prevent sluiting, as their tracks form small catchwater drains and ridges which conserve the water rather than encourage it to run down the slopes.

Cause (5).—The formation of roads and railways.—While the importance of these sluit-forming-agencies may have been exaggerated in considering the country as a whole, yet they are undoubtedly the most obvious. When driving about the country the sluiting caused by roads is a great source of annoyance to the traveller, who resents the undue wear and tear to which his horses, cart and his own person are submitted, while the owner of the land traversed by a road resents the steady encroachment by the ever-widening road belt on his best piece of veld.

Enforced idleness in a railway carriage draws the attention of passengers to the sluits formed where culverts or catchwater drains turn the drainage on to the veld, and owners naturally resent the formation of a sluit caused by water over which they have no control. The roads of the Colony, excepting in the Transkei and certain trunk roads in mountainous districts, are made and maintained by Divisional Councils. They are often mere rights of way with no limit of deviation on either side of the original track. They are often aligned in low ground, where they soon become natural drainage lines of the valley; and, when one track becomes a little heavy, a new one is started beside it. Maintenance along most of these roads is never gone in for at all; and, where it is done, the results are much the same. The following extract from a letter by Mr. Arthur Jackson, J.P., Laken Vlei, Slangfontein, Victoria West, gives so graphic a description of Divisional Council methods that I quote it in full:—

> "As an example of 'how not to do it,' we may take the road contractor's method. He is, I presume, instructed by the Divisional Council to throw banks across the roads where they are likely to be washed into sluits. He does so, but all his banks are absolutely useless for the purpose they are intended to serve and an unmitigated nuisance to travellers. He is very systematic in his work, invariably throwing a bank 18 inches or so high, by two or three feet wide across the road at longer or shorter intervals. The Divisional Council sends an Inspector, who happens to travel along without breaking a trace or 'zwingle,' and reports all in

order; and the Divisional Council is quite satisfied and pays up. Well, what is the result? The first wagon that comes along cuts the banks down to the bottom and, if rain comes shortly, away goes every bank along the whole route, either completely and the road is deepened, or the bank is trampled down flat and every vestige carried away; or, as frequently, one side is broken through and a deep hole washed out in the road. Travellers complain; the contractor comes along; learns nothing by experience; same work done till a deep sluit is formed, and so a new road is constructed alongside and kept in repair on the same systematic method until it in turn has to be abandoned."

Another extract from a report by the Resident Magistrate of Butterworth is very typical of a large number of complaints from the Transkeian Territories:—

"There is, however, another source of sluits in this country, and that is the extravagant and reckless manner in which good grass land is wasted on our wagon roads. These for the most part are merely informal tracks, liable to destruction, more especially in wet weather, by the heavy traffic which passes over them; and the practice is, where one track becomes unfit for use, for a fresh one to be formed beside it. The old track, being denuded of grass, soon becomes a water course, and the water course in turn a sluit, and this process is going on all over the Native Territories. I might instance a case which has come under my personal observation within the past three weeks, where a short length of road was a year or two ago avoided by traffic during wet weather because the soil, being of a clayey nature, draught was then heavy, and because a couple of heavily laden wagons had passed along it and so cut deep tracks into the spongy soil. When the road dried after the cessation of rains, the traffic did not return to the original track, because by this time a new and smooth one had been formed, while the wheel tracks in the old one remained deeply indented and fringed with jagged edges of sun-baked mud, liable to cause distress to man and beast travelling over them. These wheel-tracks formed an excellent water course, and the following year storm after storm sent its waters rushing down them; and now, after a lapse of about three years there are two parallel sluits of a couple of hundred yards long, each ranging from 6 inches to 3 feet in depth. I regard this matter of abandoned wagon tracks as a much more fruitful source of danger to the Native Territories than over-stocking, and one which is yearly destroying acres and acres of valuable pasture land."

In the Transkei and sour veld districts generally, roads appear to be the only appreciable cause of sluiting. In the Karroo they are one of several main causes. Being in charge of Government or of public bodies, such as Divisional Councils or Municipalities, etc., they form a good subject for legislation, and this will be kept in view when dealing with remedial measures.

Railways are by all considered great offenders, and to a certain extent this is admitted by the railway staff. Cross drainage must be taken across the line at intervals, and this means concentrating the flow at certain places which are usually selected because they are low. Excepting at prohibitive cost, railways and roads must always give rise to a certain amount of sluiting, and remedial or preventive measures must not aim at unattainable ideals.

Part III. of the memorandum dealt with the effects of sluiting under seven sub-heads. The correspondence has not proved of much value in this section, as in most cases the evidence is vague and obscured by conditions prevailing at the close of a very severe drought.

The following possible effects, mentioned by Mr. Gordon in his memorandum, cannot be demonstrated with any approach to certainty. Diminution of rainfall, decrease in subsoil water, and increase in the depth below ground of the water surface in wells, diminution in the strength of springs, reduction of "brak" by affording an outlet for subsoil drainage water, and reduction in the area of cultivation owing to the drier condition of the subsoil. So far as climate is concerned there is no proof whatever, so far as I can ascertain, that it has changed, or the average rainfall diminished, within recent times. Karroo rain gauges are very widely scattered, and the rainfall is generally obtained from sudden thunder storms which are very local and vary greatly in intensity within the wetted area. The total precipitation at any one place varies greatly from year to year. Again, most rain gauges are put up in low-lying places, and we have practically no records of the rainfall on the mountains. Mr. Stewart, of the Meteorological Commission, assures me that there is no evidence to justify any presumption that the climate of the Karroo has changed, and to obtain information under the peculiar conditions obtaining in that region a long record of a very great number of stations would be necessary. Apart from this, it is very unlikely that in the case of South Africa the gradual denudation of the plant-bearing soil, and therefore the disappearance of vegetation of the type common in the Karroo, can have much effect on climate. According to Mr. J. R. Sutton, M.A., F.R.Inst.S. (Transactions South African Philosophical Society, 1903), our rain originates on the equator, and is carried south in the upper atmospheric currents flowing from west to north. The rain begins on the East Coast when this moist upper stratum meets the lower bodies of air, damp with moisture, from the Indian Ocean. Then it gradually works back from the East Coast as the eastern air becomes heavier with vapour. These currents are not effected by local conditions, and the Karroo would still have its thunderstorms even if stripped as bare as Sinai or Palestine. Large forests never existed in the Northern or Central Karroo within historic times, and the grass or low scrub can have but little influence on the rainfall. Were it possible to establish great belts of forest in the Karroo, this would undoubtedly tend to increase the rainfall and cause it to be more uniform from year to year, and more evenly distributed but the change in vegetation which has occurred during the past century, due to the increased rate of erosion, cannot have had any effect on climate. Statements often made by individuals that rainfall has diminished within recent years are of little value. Periodicity in rainfall has as yet not been proved in South Africa, though statistics from some of the oldest established stations appear to indicate the possibility of cycles. Most countries which are dependent for their rainfall on the world's great atmospheric currents have periods of wet and dry years. Whether regular periodicity can be proved or not, South Africa, like India, has recently gone through a very severe period of dry years; and the opinion of people whose rain gauges were established five or ten years ago, and whose memory goes back perhaps 20 or 30 years, is in a matter of this kind of very little scientific value. Peoples ideas about climate and rainfall are universally erroneous, being influenced by the review of what has happened during the preceding few months, supplemented by defective memory in the past. Scientific meteorological experience, throughout the world, shows how very difficult it is to arrive at any definite conclusions regarding the natural laws governing climate and rainfall from the scanty data collected during the past half century.

The decrease in the subsoil water supply, and increase in the depth below ground of water surface in wells, is another possible effect which cannot be substantiated. Springs have nowhere been systematically gauged for long periods, nor the depth of water in wells measured. The strength of springs and the depth of subsoil water vary greatly according to the conditions of rainfall. A good fall of snow on the mountains is of great importance to the springs. In the year 1851, 1852 and 1853 snow lay on the Sneeuwberg and Winterhoek Mountains from April in each year till August, and this so strengthened the springs that, according to the inhabitants, no complaint of low springs was heard for the subsequent 15 years. During the recent long drought there was a great diminution in the strength of springs and the depth to subsoil water in wells was increased. Many springs failed entirely, and correspondents writing during 1905, were naturally impressed by these facts, and many were induced to agree with the idea that these phenomena were due to "sluiting" as suggested in the memorandum. The very rainy summer of 1906-'07 has done much to counteract the effect of the drought on springs and wells, and I doubt whether any clear proof could be given that the average volume of subsoil water has diminished during the past 50 years from any cause at all. It must be further remembered that the subsoil water is now being tapped in ever increasingly large volumes by means of boreholes and open wells, which fact alone would suffice to account for a diminution in the subterranean supplies, more especially as these are greatly drawn from supplies near the surface. The Report of the Chief Engineer for Public Works, for the year 1906, shows that since 1893 the yield from boreholes made by Government drills amounts to about 50 million gallons per diem; and that of boreholes made by contractors under subsidy in the three years, 1904-1906, amounts to about 66 million gallons per diem.

With regard to the reduction of "brak" by affording an outlet for subsoil drainage water there is no evidence whatever. It is questionable whether, in the case of old vleis and pans the formation of sluits have any appreciable effect. Formerly, with each flooding of the vlei, the alkali salts were dissolved and carried a considerable depth into the soil before evaporation had time to bring them to the surface. Now, since rivers and sluits have been formed, these same vleis are dependent for their moisture on scanty rain which soaks but little into the soil, and quickly evaporates, causing the alkali salts to remain near the surface. There is ample evidence of increased alkali troubles, due to seepage from reservoirs, "zaai" dams, etc., and to unskilful irrigation, but there is none to prove that improved drainage, due to sluiting, has diminished "brakness" in the soil.

Finally, as regards the diminution of cultivation owing to the drier condition of the subsoil, no direct evidence can be produced. Cultivation in the arid parts of the Colony, without irrigation is very rare and fitful, being attempted only in seasons of good rainfall. The only criterion by which the amount of moisture in the soil can be gauged, is the condition of the veld, and here the evidence is overwhelming. In place of countless vleis covered with high grass and pools, we now see dry flats covered with scrub and intersected by sluits. In place of country which was formerly covered with trees and shrub we now see barren waste almost devoid of vegetation. Wild animals of the largest species, such as elephants, hippos and rhinoceros, were plentiful in many parts of the country where it would now be physically impossible for them to exist.

The more rapid "run-off" of the rainfall, leading to the denudation and erosion of the soil, to an increase in the dimensions of the floods in all streams and rivers, and to the more rapid silting up of reservoirs, the change in the nature of the vegetation on the uplands, and in the vleis,

and the extermination of certain valuable bushes; the bad effects of these changes and of the drier condition of the soil and subsoil, on the drought-resisting power of the veld, are all effects which are so obvious, and so thoroughly appreciated by farmers throughout the country, that it is hardly necessary to substantiate the statements further than has been done in the early paragraphs of this note. I will now deal with the

Possible and Practicable Measures for Prevention or Mitigation of the Evil.

In considering possible measures for the prevention of sluiting, only practicable, *i.e.*, financially feasible measures, will be discussed at this stage. The evil has been allowed to go on for so long a period that any idea of attempting to re-establish the physical conditions prevailing in the Colony fifty to a hundred years ago would be visionary. The big rivers which have cut their way through old vleis are now established geographical features, and the enormous expense of closing them can only be justified when the necessary works are carried out as a financially sound irrigation project. Our efforts must be directed against (*a*) the prevention of further denudation of the veld by surface washing; (*b*) the conservation and controlled use of floodwater for irrigation purposes; (*c*) the reclamation of land where erosion is not far advanced, and (*d*) the prevention of extension of sluiting.

The first subhead (*a*) is by far the most important. The surface soil on the gentle hill slopes is very shallow, and over most of the Karroo consists of the sandy soil known as "rooi-grond," which is formed mainly of disintegrated dolerite. This soil contains little clay, and is very easily carried away by surface drainage. It has already been described how over-stocking causes the destruction of vegetation and the formation of a loose mulch due to constant trampling by small stock, and how with the first rain enormous quantities of this loose surface soil is washed away. Distinct sluiting, in most cases, does not accompany this denudation, excepting near the main drainage channels of the tract, but it is all the same one of the main causes of the whole sluiting evil. As the veld becomes denuded of its thin layer of soil, and of its protective covering of vegetation, the "run off" becomes more rapid and violent in its effects. Where the rainfall formerly soaked into the soil or trickled slowly over the surface it now flows off rapidly, carrying away soil and seed, and towards the foot of the slopes the volume and velocity is so great that large dongas and sluits are formed. On the sloping hill sides, and, in fact, on all grazing veld unsuitable for cultivation, indirect and direct methods to stop the trouble can be adopted.

Of indirect methods the most effective are to maintain a minimum density of vegetation and to reduce the trampling of the veld by the stock as much as possible. To achieve these objects the following measures should be adopted: (*a*) The veld should be divided into large camps by fencing which should be vermin proof where necessary. (*b*) Each camp should have its own watering place, if possible. Where this cannot be arranged watering places should be scattered about the veld at the rate of one for every thousand to fifteen hundred morgen; each camp, however, having direct access to one. (*c*) The camps should be planned in such a way that the stock on their way to the watering places will generally move across the slope. (*d*) All wind shelters of aloes or trees should be established in level lines across the slope, and never in the direction of the slope.

The measures described above will have the following beneficial results:—(1) The stock will move about the veld for grazing and watering

only, and the latter operation will not generally involve a special journey. (2) All superfluous trampling of the veld, due to long journeys to and from the kraal evening and morning, and to sometimes excessively long journeys to watering places, will be avoided, thus greatly benefiting the veld, which suffers far more from this constant driving of herds across it than from the deliberate movements of a grazing sheep or goat. (3) The benefit to the stock by stopping kraaling at night, and the often cruelly long journeys to watering places and kraals, should induce farmers to adopt jackal-proof camps. (4) Another equally important advantage of camps is that by grazing them in rotation the minimum density of vegetation can be maintained. Considering the almost national importance of encouraging the formation of camps, both for the benefit of stock and for the prevention of sluiting, it seems to me a pity that the large sums of money now devoted to rewards for killing jackals is not utilized to assist in the erection of properly aligned vermin-proof camp fences. The correspondence received from farmers all over the Colony shows clearly that the connection between jackals and sluits is very fully realized. By aligning the camp fences, so that the movements of the stock will be across the slope, the tracks formed by them on their way to the watering places will help to conserve the water rather than encourage it to run down the slopes. The parallel tracks across the slope form a series of catchwater drains, and these drains should be encouraged by the collection of stones and bush across small sluits or depressions. Everything should be done to prevent the water from gathering in volume and velocity—in other words, from attaining momentum and becoming uncontrollable.

Next to restricting the "run-off" from the veld, the most important measure is to utilise the flood waters to the fullest extent possible for irrigation purposes, as high up on the catchment areas of streams as possible. The higher up a river we go the easier it is to control the flood water. Irrigation works near the sources of streams are not only undertakings highly profitable to their owners, but are of immense public utility. They absorb a large portion of the flood which would otherwise run to the sea with its precious burden of silt. By causing it to flow in regulated volume over large areas of land, a considerable percentage of the flood water is slowly and steadily returned to the stream as seepage water, causing intermittent streams to become perennial in their lower reaches and thereby enhancing the value of riparian lands lower down to an enormous extent. Every upper proprietor, who constructs works for the irrigation of land within the catchment area of the stream drawn upon should be looked upon as a public benefactor by all lower riparian owners, as he is directly instrumental in establishing permanent supplies on farms lower down, which may be the means of saving thousands of head of stock in time of drought. Irrigation works, which mostly divert flood water on to lands and veld, are sufficient to produce this result, but storage works are even better, as they are capable of dealing with greater volumes of flood water. A river which has preserved many of the typical features of Colonial streams of fifty years ago is the upper half of the Seacow River, in the Middelburg and Hanover Divisions. The course of the river is marked by a series of vleis and poorts, and the channels have as yet not developed to the enormous extent so noticeable on other parts of the Karroo. In the Middelburg district there are several enterprising farmers who have made good use of the topographical features of the country, and have constructed irrigation works to flood the old vlei lands for cultivation or improvement of the veld. The possibilities for further development of irrigation on this river are very great, but enterprise is unfortunately lacking. The result of four or five irrigation farms high up the valley has already benefited the Seacow river to a very high degree,

and very little more enterprise would make it a true perennial stream throughout its course, and preserve from ruin thousands of morgen of beautiful country suitable for crop or veld irrigation. The upper reaches of all Karroo rivers should be carefully examined, and owners urged to make use of possibilities offered by nature. Irrigation works high up the valley are seldom very large or costly, and the most suitable type of work will in each case depend upon local conditions. The chief point which I wish to bring out is that well-designed irrigation works on the upper parts of catchments are one of the most efficient preventives against the evil effects of sluiting. They are at the same time a source of wealth to the owners, and carry with them a large unearned increment to the lower proprietors in the shape of perennial water supply which, unfortunately, is all too seldom made use of.

We now come to the more difficult task of the reclamation of land in which sluits have commenced to form. This may be either on the sloping ground of hilly or undulating country, or on the old vleis at the bottom of the valleys. Taking the low flat ground first, the formation of sluits or a river through the vlei and the consequent drainage and drying up of the same is generally due to the large increase in the volume of flood water coming down from the denuded and sluited hill-sides. In former times the run-off was slow, and the drainage moved slowly in a broad sheet over the surface of the vlei. The greatly increased velocity, due to the much greater volume of water running off, soon caused the formation of sluits and the deepening of the numerous poorts which invariably close up the lower end of old vlei. When it is desired to reclaim a vlei of this kind the only feasible and profitable method is to reproduce the original conditions by the construction of irrigation works. As the volume of water to be dealt with has largely increased, considerable skill is often required, as, unless flood water is properly controlled when turned on to the veld, the remedy may lead to worse sluiting than before. Three kinds of flood irrigation schemes may be possible. Given a large area of good irrigable land, say an old vlei dried up by a deep river having been formed through it and surrounded by good irrigable Karroo soil; a good site for a dam with natural overspill; and an area of poor land above the dam, which will be submerged by a reservoir, then these very favourable features should be made use of for the irrigation of crops, etc., even if two or three farmers must co-operate. It, unfortunately, too often happens that the submerged land, the site of the dam and the irrigable land are situated on different farms. The cheapest way of working in such a case is for the owners to combine and divide the irrigable area between them or form a syndicate. The method usually advocated in such a case is for the Government to buy out the farms, construct the works and then sell the irrigable land in small lots. Unfortunately Government seldom makes a success of such enterprises. The purchase price of the land is generally in excess of the market value, and there are a variety of influences at work which make it difficult for the State to administer an irrigation settlement of this kind with any prospect of financial success.

The reasons for this state of affairs are subtle and numerous, and more or less common to all States with free institutions, especially to small ones, and it is simpler to obviate the trouble by encouraging private or co-operative enterprises, assisted as far as possible by the Government, than to attempt to improve the conditions and embark on doubtful costly enterprises. The physical, social and political conditions which make great Government irrigation works such an enormous success, both from a financial, and agricultural and economic point of view in India and Egypt, are almost wholly wanting in the self-governing Colonies.

Where private lands are concerned, private enterprise should carry out irrigation works in this country, such enterprise being encouraged and assisted by the State both with professional advice and with loans on easy terms; and, if large or complicated, worked by the State for a number of years. Purely Government schemes should only be attempted where they are of great magnitude and Crown lands involved.

The white population of the Colony is small and local political influence disproportionately great, and under such conditions it is well nigh impossible to make a State irrigation work pay interest charges.

The second class of irrigation scheme would be suitable where storage works are not feasible, and would consist of one or more diversion weirs across the river or sluit with furrows taking out on one or both sides. Such schemes may be made for crop irrigation or for veld irrigation. In either case it is flood irrigation, and leads to a gradual silting up and reclamation of what may at first be poor and shallow soil. The best examples of such schemes in the Colony are to be seen on Mr. W. Southey's farm at Varken's Kop, near Schoombie, and on a smaller scale on Mr. Hall's farm, "The Willows," on the Sea Cow River, in the Middelburg District. Similar schemes could be carried out by the hundred throughout the Karroo.

The third type of flood irrigation is the zaai dam system which, from a reclamation point of view, is the most economical, effective and profitable. This system, however, is only suited to the very wide and flat valleys of the north-west, and can be seen at its best on the Zak and Klein Fish rivers in the Calvinia, Fraserburg and Kenhardt districts.

On the sloping ground of hilly or undulating country, the reclamation of sluited ground by means of irrigation works is seldom feasible and measures must be adopted which have for their sole end the closing of sluits and the improvement of the ordinary grazing veld. In this connection individual effort is necessary and in his own interests every farmer in the country should do his share of the work. The methods of stopping sluits, which will now be described, are all inexpensive, and should be steadily persevered with whenever a farmer can spare a few boys for the purpose. A great variety of ideas have been submitted by different correspondents, and those which are the most simple and efficient are here enumerated:—

(*a*) Very small sluits can be closed by pegging down bush, stems upstream, about every 30 yards. A forked branch should be used and the bush should be held down firmly.

(*b*) For larger sluits make a low bank of alternate layers of bush and boulders, sufficient weight being used to make a compact bank.

(*c*) Make frequent obstructions of boulders, held in place with rough wire netting, or simply stretch wire netting across the sluit, and fill above it with boulders and bush.

(*d*) Where neither large bush, trees or large stones are procurable, the following method has been adopted in various parts of the Colony with advantage. A wire net, suficiently large for the purpose required, is constructed of fencing wire with a mesh suited to the material to be contained, is laid on the bed of the sluit and its upstream end securely anchored to stakes, stumps of trees or large stones. A pile of stones or earth and bush is then laid on the upstream half of the net, and the lower half folded over the top of the pile and laced with wire to the upper half.

For small sluits the little works described above are generally sufficient, but they must be numerous, and work should not cease with mere

building of temporary obstructions. As soon as some silt has been deposited behind one of these bars it should be planted with aloes, willows, tamarisk or some other similar shrub. The American Aloe appears to be accepted by farmers as the best plant for this purpose. It is very hardy; makes a good shelter, and can be used as food for stock in times of drought. Damming sluits on steep ground without following up the advantage gained by planting suitable shrubs to make the result permanent is of little value.

The important question for a farmer to decide is where to commence closing sluits. If the work is started too low down, the volume of water to be dealt with may be too great, and above a certain point reclamation may be considered unnecessary. Generally sluits should be stopped from the point where they encroach on good grazing veld. Large sluits have their origin often in deep mountain kloofs, and to attempt to stop these is pure waste of money. Above a certain point the country becomes too steep and rough to be of any value, and the run off from the rocky mountain slopes is very rapid and the drainage is confined to a series of narrow gorges. These torrents flow with a very precipitous slope for a certain distance, when suddenly the slope becomes flatter and the velocity smaller by reason of the obstruction caused by the detritus which the torrent itself has carried down. Below this again the slope rapidly becomes flatter still, the kloof widens out, and the torrent enters the good grazing veld. Streams of this sort cannot [illegible]ned by heaps of boulders and similar temporary structures. The [illegible] to harness them as soon as possible after they enter fairly fl[illegible]d make good use of the flood water which is rich with fertile [illegible]e mountains. The sluits, which it is every landowner's duty [illegible], are those which have their origin lower down on the slopes of [illegible] grazing veld or even in the vleis below. These latter are really the evils which we are now considering, and they should invariably be stopped as near to their source as possible. The process of closing sluits is not one which requires only an initial effort. It requires continual attention year after year. The stopping of a sluit will in the first instance cause the drainage water to spread over the ground on both sides. This will cause the immediate deposition of silt which the water with its reduced velocity can no longer carry in suspension. This silt deposit will not be evenly laid down, and after a short time the water will gather towards some slight depression, and, becoming concentrated, will tend to form a new sluit which must be promptly stopped early in its course. Sluit stopping on steep ground, if intelligently carried out, will enormously increase the value of the veld, but it requires continual watchfulness and prompt action. The expense is small, a few boys after each good rain will maintain complete control over the drainage across the veld.

In order to secure an even flow of drainage water across land, especially in the alluvium of the valleys, lines of trees such as accacias, tamarisk, willow and quince, or aloe hedge, should be grown. Every plantation must, however, be made athwart of the direction of flow of drainage.

Mr. Bradfield, of Dordrecht district, has advocated belts of pampas grass for the same purpose, chiefly with a view to prevent the silting of irrigation dams. I have intimate experience with grasses of the Pampas variety, and can testify to its efficacy as a silt catcher, but in Northern India these grasses are generally an unqualified nuisance. No animal, wild or domesticated, will eat them, and they are difficult to eradicate. We have already a great variety of noxious weeds in the Colony, which have been introduced originally as garden shrubs or accidentally, and I am doubtful as to the advisability of establishing a fresh variety.

For the conservation of water and prevention of sluiting by reducing the "run-off," afforestation of the hill sides and stoppage of the practice of veld-burning are most important factors. Tree-growing on a large scale on the high and hilly parts of the country is unfortunately a very difficult and costly matter, and requires also more knowledge of scientific forestry than the average farmer possesses. A great deal can, however, be done in a small way, and the article by Mr. J. Sim, Forest Officer, in the *Agricultural Journal* for September, 1904, contains much useful information in this connection.

Prohibition of veld-burning is often recommended as a preventive measure. In the Karroo, where this practice would be most pernicious, it is seldom deliberately indulged in. In the grass veld of the North it is a very common practice to burn the veld in order to obtain a growth of sweet grass, and accidental fires are very common owing to the inflammability of the dry grass. In many sour veld districts in the South and South-west of the Colony, it is done systematically and erosion of the soil is thereby encouraged. On the high mountains of the Zwartberg, and Langebergen and other ranges, fires are very common, and have led to the almost complete extermination of vegetation and denudation of the soil, and consequently to the increased run-off of rain water and the drying up of springs. In the grass veld and sour-veld burning has few advantages, but it has enormous disadvantages; and, while the advantage of veld-burning is of a very transitory and doubtful nature and affects the land burnt only, the evils of burning are lasting, irreparable and far-reaching, affecting an area of land hundreds and perhaps thousands of times greater than the area burnt. In the interests of the country at large, veld-burning should be considered a dangerous practice and prohibited throughout the country.

It now remains only to find remedies for sluiting caused by the direct agency of man, mainly railways and roads. It will always be practically impossible to entirely prevent sluiting from these causes owing to the very great cost which would have to be incurred, but a very great deal can be done to mitigate the evil. As regards railways, the matter has been discussed with the Engineer-in-Chief of the Cape Government Railways. Practically all the railway can do is to: (1) Provide a reasonable number of openings through the line—the more the better. (2) Close up existing sluits as much as possible, and turn their water on to the veld as often as practicable. (3) After the water has passed through a culvert, to see that it is not allowed to form a sluit, but that it is delivered on to the veld in as thin a sheet as possible. (4) In order to counteract the sluiting tendency of borrow-pits, care should be taken that new ones are not made continuous. In every chain, for a length of 10 feet, the original surface of ground should be left undisturbed. Where old borrow-pits are showing a tendency to sluit, stone and bush or stone and wire checks should be made at frequent intervals. In substitution for culverts it is a common practice in India, in the case of surface lines, to lay the railway track on a long low bank of loosely packed boulders or rock through which the drainage finds its way. Such a drainage crossing is an excellent sluit preventer. It may in many cases be a difficult or expensive matter to repair the damage to land caused by existing railway works; in new works, however, the drainage question must receive more careful attention than has hitherto been the case, even though this may mean increased cost of construction in providing additional crossings. In railway construction far too little attention is bestowed on the drainage water after it has been concentrated by the works into large volumes and passed beneath the line. The railway being responsible for the concentration of drainage, thereby making it a sluit-making tool, is equally responsible for its subsequent behaviour.

Roads, especially those in charge of Divisional Councils, are by far the worst offenders. In what way they offend has already been fully described. As a cure, if even only partial, I recommend the following:—

First and foremost, the limitation in width of all roads maintained by Divisional Councils or the Public Works Department. Part V. of Act 40 of 1889, deals with the definition of width of roads, but entirely from the public point of view. That is to say—a certain width, varying at the discretion of the Divisional Council, is proclaimed, and no encroachment by landowners upon the roads, the width of which has been defined, is permitted. Very few roads are demarcated, and where unfenced the track very soon becomes tortuous; and, in many cases, the width actually occupied by old tracks, which have become sluits, and new tracks in use, very greatly exceeds the width as defined. It is, of course, possible for a land owner to put up fences along the road, but this is often an expensive undertaking. What is required is that all roads should be demarcated by beacons or otherwise in a conspicuous manner, and the Councils must maintain their roads along the original alignments in an efficient state of repair. Land owners should do their utmost to fence their property adjoining the roads, and where encroachments are numerous financial assistance should be given to the owners by the Council to effect this. Until some drastic means are devised to compel Divisional Councils to maintain the roads properly, the present pernicious method of letting things drift will continue, and hundreds of square miles of good veld will be wantonly sacrificed.

Equally important is the question of maintenance itself. The very unedifying description of how roads are repaired, which has been quoted above, is only too true. The only way to put a stop to useless waste of money of this kind is to insist upon a carefully-considered specification, drawn up by the Public Works Department, being rigidly adhered to. It is not enough for farmers and travellers to simply grumble and write to the newspapers about badly kept roads. Landowners should resist all encroachments of the road on to their veld by fencing and other obstructions; and when travellers, confined to the defined width of the road, come to grief through negligence on the part of the road authorities, it is in their power to obtain redress. This matter has assumed national importance, and the time has arrived when an improvement should take place even if Government interference is necessary.

Much of the trouble with the roads is due to their bad alignment. They often run along the lowest parts of a valley where their transformation into sluits is almost a natural consequence. Wherever possible, roads should be aligned along local ridges. Where run on sidelong ground, proper works must be constructed to pass the drainage across the roads and for this purpose pitched depressions or "Irish Bridges" of ample width are far less objectionable and much more lasting than the humps of loose earth which are always wrongly and badly made, and never in repair when most needed, and are moreover very trying to travel over. As in the case of railways, the drainage must be delivered across the road in as thin a film as possible, and "Irish Bridges" effect this much more readily than a series of abrupt humps. When a road must be aligned in low ground, then it should be artificially raised above the level of the veld. The whole question of the alignment, construction and maintenance of Divisional Council roads might be taken up by the Government; but, as with railways, so with roads, the officers in charge of these must look a little further than the immediate limits of the works, and endeavour in every way to counteract any tendency to sluiting of the veld which may arise out of interference by the road with the cross-drainage.

It will be seen from the paragraphs dealing with remedial measures that there is little scope for legislation. It may be advisable to do so in connection with the maintenance of roads, and I think that over a large part of the Colony the practice of burning the veld should be prohibited by law, as has been done in many older countries; and the ruthless cutting down of indigenous trees not only on Crown lands, but also on private property should be prevented. The cause can be best served by Government assisting the farmers in various ways in the construction of irrigation works, tree-planting ,and fencing; and by doing all in their power to reduce the evil caused by State railways and other works to a minimum.

In exceptional cases it may, in future, even be advisable for the State to undertake certain reclamation works on its own account.

The main object of this report is to bring home to all land owners in the country that every one of them is capable of, and should be doing something towards the mitigation of the sluiting evil. Many of the remedial measures which I have indicated are simple and cheap, and there are on every farm times when boys are available for this class of work. The matter is one in which the Government can do but little direct good, but is essentially one to be tackled by individual effort, and we must trust to the sense of duty and patriotism of the farmers of South Africa if the continued rapid deterioration of the country is to be prevented.

CORRESPONDENCE.

Correspondence and contributions are invited on all subjects affecting the Farming Industries of South Africa, suggestions for consideration or hints as to improved methods being particularly welcome. It should in all cases be distinctly understood that we do not hold ourselves responsible for opinions expressed or statements made.

Questions are also invited. In this department, every endeavour will be made to procure the desired information for publication in the next issue, but this cannot be guaranteed in the case of letters received after the 20th of the month. Should a correspondent deem his enquiry urgent, he should say so, and an answer will be returned *through the post* as soon as possible.

All letters or contributions should be plainly addressed: "The Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town"; they should be written on one side of the paper only, and be accompanied by the name and postal address of the writer, not necessarily for publication, but as a guarantee of good faith. A *nom de plume* may be attached for publication.

Lincoln-Merinoes and Other Matters.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Can you, or any of the readers of your widely circulated Journal let me know:

1. Whether good Lincoln Rams are to be had in this Colony, and from whom obtainable? Also what sort of a cross would be produced by crossing them with good Merino ewes? Would the wool of the first cross be of any particular value?

2. What remedy would you suggest for a horse "brushing" in harness? I have a pony that "brushes" badly in both hind feet when in harness. He is trained to the saddle but never has that failing when ridden.

3. Is it better to feed horses on soaked mealies or to give it to them dry? I have asked several local farmers, but opinions differ very considerably. Thanking you in anticipation.—yours, &c.,

FARMER.

Beaufort West, October 11th.

Lincolns were tried in this Colony some years ago, but we know of none now available. They cross with the Merino well enough and give a large-bodied butcher carcase with a long mixed coarse fleece. We have also seen the Persian crossed on Lincoln ewes with gratifying results as to carcase.

To prevent a horse "brushing" in harness, have him shod well under both feet on the inside, with the clip at the toe instead of at the sides.

Dry mealies are better for a horse than soaked. All grain should be fed dry to horses.

Too much Water—Need of Drainage.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I beg to write you these few lines kindly requesting you to give me, through the medium of your *Journal*, some advice on the following point for the mutual benefit of myself and readers of same.

My farm is situated on the Zak River, which here forms a large vlei. I thus have plenty of water, in fact, the whole is undermined with it, even under my homestead. Water can be easily dug and found at a depth varying from 10 to 15 feet downwards.

The ground is soft, loamy and porus, but not brackish. Crops thrive fairly well, but, unluckily, I cannot get trees, either fruit, deciduous, or any other kind to grow on my farm. I have tried to plant trees of several kinds, they grow up to a certain height and size, then they begin to dry and wither at the top, the roots become rotten and just like dust, and thus they die. As I am very desirous to improve my homestead by way of planting trees (fruit and other kinds), I shall feel very much obliged if you let me know what I shall have to do in order to succeed, as I shall not spare expense if a good, sound, trustworthy advice is given me.—Yours, &c.,

T. G. THERON.

Kenhardt, Sept. 30th.

Such a case as this is not common in a dry country like South Africa, consequently is not generally understood. The remedy indicated is to drain that portion of the land where the trees are to be planted. Evidently the water is too plentiful for the growth and the level stands too high in the soil. Cereal crops would not be affected so much as the roots do not go very deep. But with trees the roots naturally penetrate deeper, and when they get into the water are drowned and the tree dies. The only remedy, therefore, so far as one can judge from the letter, is to open up the ground by means of deep sluits or drains and allow the water to drain through instead of remaining in the soil.

Farmers and the Feather Trade.

To the Editor, AGRICULTURAL JOURNAL.

SIR.—The innuendo conveyed by "Macedonian's" letter with reference to the much maligned Jewish feather buyer seems to call for some reply on their behalf. I may premise that I am not an Israelite neither am I a buyer, but my business has brought me much in touch with the trade, and I find the Jewish buyer is not the only party who seeks to get the best of a bargain. So with your permission I would like to show a little of the other side of the question.

"Macedonian's" belief seems to be that the Colony was designed for none but its "Great Backbone"—that there should be no middle profits between grower and consumer. A fine theory, doubtless; but one which, during the last 5,000 years, has never worked well in practice. There are a few thousands of us who are neither one nor the other who somehow also desire to live and to earn that living honestly.

"Macedonian" states, Jewish buyers prefer to buy at one price for wings all over and one price for shorts. I presume he refers to contracts extending over a considerable period as that is not the case in the buying of individual parcels. Very well. Now, has not the farmer every bit as good an opportunity of judging the prospects of the market as the Jew?—or is the admission tantamount to saying that the latter is the better and further-seeing business man?

Take a contract at, say, £8 for Whites, £6 10s. for Feminas and 20s. for shorts. Does the farmer as a rule note how often the Jew pays him these prices for rubbish not worth half the value? I trow not. But when it comes to the farmer handing over some super stuff now and again it is then he runs to the papers to cry out how he is being "battened upon."

The Jew, on the other hand, being as a rule a bit of a philosopher coolly writes off his losses and lies mum patiently expecting a *coup* with some super goods or a rising market.

With regard to the arranging of feathers for sale—especially in contracts—let me make a few suggestions which my experience shows me is much needed by many feather-growers. Attention to these points would often command better prices, even from the Jew. The suggestions are:—

Don't stick short quills without flue or wiry stuff picked up in the kraal among Whites or Fems.

Don't mix short Blacks and Drabs with Wings and expect them to pass as Fancies.

Don't use rope to tie up your bunches.

Don't pluck your contract birds just after rain to make the plucking heavier.

Don't "pull" feathers and snick off the tips of the quills and expect them to go as "cut quills."

Don't fill the centre of Long Black and Drab bunches with short Floss—its easily detected.

Don't leave the wings on the birds after they are ripe so as to get more quill to make weight.

This is not drawing the long-bow. If you, Sir, had seen as much of the above "dont's" done as I have among those who shudder at any deceit in another walk of life, you would be inclined to think there was rather more of the "Egyptian spoiling the Israelite!"

Let one actual istance (from among dozens I could quote) suffice. A certain farmer, of an aristocratic name and family—I believe they boast arms and crest—brought his feathers and saw them weighed personally, haggling about a quarter-ounce in spad. Owing to his goods being supposed to be super stuff, his contract reads: "Whites at £10, Fems. at £8, and Shorts at 25s. per lb." His Whites were packed in the centre with short Blacks and his Feminas with ditto Drabs, but he maintained, of course, as usual, that they must be White as they were "off the row." Well, within fifteen minutes after they had been weighed to *the fraction of an ounce* I saw *over 4 ozs. of short quills removed from his Wings!* They were not worth fivepence all told, but he had no compunction in accepting from the Jew 50s. for them all the same. And in addition I saw removed several ounces of genuine shorts not worth more than 25s. per lb. according to contract price. I must confess I had a greater respect for the Jew who took them uncomplainingly than for the pseudo-aristocrat. And I can assure you it happens *every day*.

Now, with regard to your advice to patronise only large *bona-fide* dealers in large centres and not to deal with small buyers, just let me conclude by quoting the remark of a branch manager of one of the largest—if not *the* largest—firms in this Colony, and let the feather-grower ponder whether, with all his faults, the Jewish peripatetic is an unmixed evil. The remark was: "Our aim is to work out all these little Jew boys to get into direct touch with the growers and *by this means to greatly lower the present fictitious price of feathers*," which, in other words, means, "We would like a Trust in Feathers and allow neither farmer nor Jew to make a profit but keep the lot for ourselves." *Verb sap.*—Yours, &c.,

CARTHAGENIAN.

"Carthagenian" admittedly quotes extreme cases. Whatever good the peripatetic dealer may accomplish in the ostrich feather business, it must be recognised that he is not in it for the sake of his health. As to forming a "ring" or "trust," that could easily be frustrated by the producers standing together. The ostrich feather trade has now grown to the dimensions of an established industry, and it is high time that those interested saw that it was conducted on sound commercial lines, the same as all other industries, and not left so much at the mercy of so unstable an element as the travelling buyers.

Farming on the Halves with Natives.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your valuable paper I have never yet seen a discussion on what I consider a great drawback to the agricultural prospects in this country. I refer to the custom of the large landholders in giving their land on halves or shares to natives. In many instances the landholder would far sooner let his land in this manner than work it himself, or let it on lease to a European, the excuse being that they can let the native work it and then clear him off instead of having it locked up for a term of years.

I consider this is a most pernicious system, and that it acts greatly to the detriment of progressive agriculture in South Africa.

Your valuable Journal and the Government Agricultural Department do all in their power to help forward agriculture. The latter with Experimental Farms and their series of excellent books and pamphlets to educate the farmer and put before him all the latest discoveries

I would ask is the native, working on shares, the man to avail himself of these benefits or to advance the agricultural interests of this country?

Trusting to see someone more able than myself express their opinion on this subject.—Yours, &c.,

AGRICULTURE.

Port Elizabeth, Oct. 1st.

The Value of Windmills.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Since the importance of irrigation by means of windmills very largely affects the South African farmer, and since the subject of windmills is frequently dealt with in your Journal, I venture to bring to the notice of farmers, through this medium, a few facts concerning windmills in particular which are sure to prove of considerable value to many unacquainted with the possibilities of windmills.

Many look upon windmills as mere playthings, only suitable for pumping sufficient water for domestic purposes or small flower gardens. This impression arose from the large number of failures seen everywhere. These failures, in turn, are due to (1) An inferior mill incapable of doing its work when nature provides variable winds and working only in a particular wind velocity for which it was built. (2) An inferior mill incapable of resisting safely the variable stresses to which it is subject, even when not working, and hence necessitating continual repairs. (3) An inferior mill, incapable of taking care of the pump, which it has to operate in high winds, thereby pulling or jarring the pump cylinder valves or rods to pieces necessitating continual pump repairs. (4) An inferior mill incapable of taking the maximum energy from the wind and converting it to useful pumping work thereby causing heavy loss of work done during any given period. (5) Inferior engineering and erection of windmill plants. In quite a large number of cases windmills have been sold with pumps and erected where the pump is entirely out of proportion to the mill which has to drive it. In quite many cases, too, the persons responsible for the engineering of a windmill plant for a given locality have shown a marvellous lack of knowledge of wind velocities obtaining at that locality.

Given a thoroughly good and reliable windmill and expert windmill-engineering skill to plan out and erect the plant, there is now no doubt left that the windmill is a most satisfactory motor for driving pumps for irrigation purposes. A good windmill, correctly installed, will pump enough water—under average conditions—to properly irrigate from 3 to 8 morgen of cultivated land. When we consider that this amount of water is raised for the price of lubricating oil only and that this lubrication is only attended to once in every six weeks, we see at once the great advantages of using good windmills and making sure that they are absolutely correctly installed by responsible and reputable firms.

Without desiring to give any one firm or windmill a cheap advertisement, but merely for the benefit of the farmer, who may be in need of reliable pumping plant, these figures are given to show the average cost of maintenance of a first-class windmill, well engineered at erection and since running continuously in all winds:—

Mill, "Samson," erected in January, 1907, at the Government Farm, Potchefstroom, by Messrs. Malcomess & Co., Ltd. The "Samson" was erected to replace another windmill which was erected on the same place by another firm in March, 1904. Since the erection of the "Samson" in January last it has been left open to work in all winds and was never shut off once except when oiling it. During the nine months its cost of maintenance was as follows:—

	s.	d.
To ½ gallon lubricating oil ...	2	9
To repairs and spare parts ...	nil.	
Total ...	2	9

The old mill, which first stood on the same place, showed the following figures for its cost of maintenance:—

	£	s.	d.
March, 1904, to December, 1905. Repairs	£19	9	0
December, 1905, to November, 1906, Repairs .	8	12	0
Total for 32 months	£28	1	0

Expenses in maintenance per month, 17s. 6½d.

Hence this mill costs more than six times as much to maintain for one month as the "Samson" cost to maintain for nine months.

Besides this "Samson" mill belonging to the Government we have here in this neighbourhood at least eight other "Samson" windmills, none of which costs more to maintain than at the most from 8s. to 10s. per annum, and these mills are all running continuously and have been for the past two years.

There are several good windmills on the market, but it is safe to conclude that the would-be purchaser of a windmill will not be induced to buy a windmill unsuitable for his requirements if he uses ordinary care and the experience of those who have bought windmills when selecting a mill.

I have stated above that under average conditions from 3 to 8 morgen can be well irrigated by a windmill. This applies to the smaller plants operating over small bore-

holes. There are many "Samson" windmill plants to-day irrigating very successfully as many as 20 morgen of land. In such cases the water is usually drawn from rivers, open wells or fountains.

Another point which very often gives rise to doubt when the farmer contemplates irrigating lands by means of windmills, refers more to the supply than to the windmill. Briefly stated it is this: "Which plan will answer better, one or two large and deep boreholes with one or two large windmills erected over them or several small boreholes with a small windmill erected over each?" Practical experience as well as theory at once reply that small 6 in. boreholes, sunk to moderate depths, with small windmills over them, not only cost less to install and to maintain but yield in proportion much more water than larger plants. A 9 in. borehole sunk in these parts cost £3 per foot to drill. It was drilled 1,100 feet deep and thus cost £3,300. At 100 feet down water was struck which rose 20 feet. The supply was tested up to 5,000 gallons per hour. A windmill was erected and the pump placed 400 feet down. The windmill pumps from 4,800 to 6,000 gallons per hour, according to the wind, but cannot reduce the water level in the borehole below 80 feet from the surface. This windmill cost approximately £500 to install. Hence for, say, 6,000 gallons per hour the initial cost was £3,800. Now if 5 boreholes, each 6 in. diameter and 100 feet deep had been drilled instead, and over each a small windmill erected costing approximately £70 each, the total cost of boreholes and windmills would have been £850, and the quantity of water pumped would have been—under the same conditions from 7,500 to 9,000 gallons per hour.

The farmer must make sure to build a good reservoir—preferably of cement—in which to pump the water. To store the water before use is more than half the battle won.

H. BURGERS.

Potchefstroom, Oct. 4th, 1907.

Horse in Poor Condition.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Can you or any of your readers give me an answer to the following question? If a horse is in poor condition and won't get fat, what do you consider the best method of getting him to grow? The above-mentioned has been like that ever since he was bought. Thanking you.—Yours, &c.,

FARMER.

Naauwpoort, Sept. 27th.

The only hope in such a case is first to try and find out the cause. If any suggestion can be offered on this point, something might be indicated as a remedy.

The Divining Rod.—Is it a Fraud?

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Mr. C. A. Fincham's remarks in defence of the "water-stick" appear to me to be as antiquated and unsatisfactory as Mr. Henry Francis' remarks on the same subject appear to me to be fresh and sensible. I agree with Mr. Francis that after centuries of belief by some people, and disbelief by others, it is high time that the divining-rod "Professors" (and there appears to be a good number of them scattered through the country) "give us a demonstration at the next Port Elizabeth Show."

In the June number of this Journal Mr. B. M. Bowker, of Bedford, has expressed his willingness to "stand a trial test by anyone who wishes, whether private individual or Government," subject to certain conditions he names.

Now, as one who merely wants to have this question finally settled, once and for all, by some practical and crucial test (wherein "mysterious forces" and "gifts" shall have to give place to matter-of-fact scientific methods of investigation), I beg to earnestly endorse Mr. Francis' appeal to Mr. Biggs and Mr. Bowker to come forward

at the next Port Elizabeth Show and give the country a demonstration that will clear up the matter satisfactorily.

But the conditions of the test must leave no room for mysterious and unknown forces to beat a retreat to that nebulous realm so long their harbour of refuge whenever the arrows of scientific criticism have been shot at them.—Yours, &c.,

EDGAR H. R. EVANS.

Grahamstown, 25th Sept., 1907.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The differences of opinion as to the efficiency of the divining-rod in finding underground waters seems to be pretty well divided. The honours, I think, remain with Mr. Biggs at present. It is a very difficult matter to make people believe in anything of a mysterious nature, or anything they can't quite understand. Some wont believe in the divining-rod because it does not work with them; others because science can't explain it. The fact is, there is no science in it at all; as the twig is only the medium between the underground current and the body of the person operating. Anyone can use the rod. If he holds it correctly and feels a strange pricking sensation in his arms and a strong determination of the twig to bend downwards to the earth at certain spots in spite of all he can do to prevent it, he will believe there is something in it. But if he finds no sensation or movement whatever in the twig he is not affected by it, and will, of course, not believe in it. He might as well give it up and join the sceptics and indulge in a quiet sneer at something he does not understand. It is a truism of nature, and nature's laws that no two things are alike, and certainly men are as differently constituted as anything in nature. Some are fair, others dark complexioned. Some have blue, grey, hazel, or black eyes, and some in electrical parlance may be positives and others negatives. We find some men are more affected by lightning and thunder storms than others; some have what is called nerves, others none, &c., and although I have known instances of the twig working in the hands of natives, the best operators I have known have been men of light or fair complexions Whether that has anything to do with the secret or not I don't pretend to know, but here science might step in and by testing the constitution of some well-known experts, find out if they who use the rod are differently constituted from those with whom the rod will not *act*. In this way they might find out why the rod works with some and not with others. Many years ago, in Grahamstown, a French Catholic priest pointed out a spot to sink for water by means of the divining-rod. I think near the Asylum. This was reported in the Grahamstown paper at the time as something wonderful. On enquiries I made from the Revd. Father he informed me that the theory was that water trickling through the seams of rocks underground set up a current of electricity that was conducted to the body of the operator by means of the rod, if the person holding the rod was a proper medium for the reception or expelling of the current. How far that theory is correct I can't say, but that was his opinion. There is, however, one thing quite certain that the little twig has played a great part in finding water in Bechuanaland. Few wells are sunk here without first testing the ground with the twig, and few mistakes are made where it is properly applied in the hands of an expert.

Water-finding is a very easy matter in the Colony in comparison with Bechuanaland. In the Colony the high ranges of mountains are the great watersheds. The upper Karroo beds are intersected with dolerite and dykes radiating in all directions, from the great central dyke of all, the Compassberg, in the Middelburg district, and these vast plains with their great depths of lacustrine shales and sand stones that have been filled and saturated with the rains and snows of thousands, perhaps millions, of years simply overflow at the lowest or weakest point of the dykes and form natural fountains. These fountains are naturally affected to some extent by the seasons, in rainy seasons strong in dry slightly weaker. I have known a really good strong fountain to have been completely ruined by cutting deeper through one of these dykes draining the water-bearing area behind it so that it never filled up again.

In Bechuanaland we have no properly defined dolerite dykes. Water is mostly found in limestone veins, or deep in the greenstone rocks according to the formation of the district, and the so-called divining-rod has been found very useful in pointing out these veins of water.

I know some will say that it is absurd to think that a little twig can be used to point out waters over a hundred feet deep, but such is the fact all the same. I may say with the bard "there are more things in heaven and earth than is dreamt of in our philosophy." Why this is so is more than we poor mortals can tell. Some people will only believe what they see as gospel truths. Well, there is the chapter and verse for it in Exodus, chap. xvii., verses 3, 4, 5, 6 :—

3rd verse.—And the people thirsted there for water; and the people murmured against Moses, and said wherefore is this that thou hast brought us up out of Egypt to kill us and our children and our cattle with thirst. 4th.—And Moses cried unto the

Lord saying: what shall I do with these people, they be almost ready to stone me. 5th.—And the Lord said unto Moses go on before the people and take with thee of the elders of Israel, and thy rod wherewith thou smotest the river, take in thine hand and go. 6th.—Behold I will stand before thee upon the rock of Horeb and thou shalt smite the rock, and there shall come water out of it, that the people may drink: and Moses did so in the sight of the elders of Israel.

He was told to use a rod, not a crowbar or a pick.

R. J. M. C.

Vryburg, Oct. 4th, 1907.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Judging from the large number of letters continually appearing in the *Agricultural Journal* in favour of water finding by means of a stick, it would at first seem that there is hardly anyone in this country who does not believe in this power; but on second thoughts it is more probable that the so-called water-finders feel themselves obliged, owing to the weakness of their case, to keep up a continuous stream of letters in order to bolster up this absurd superstition.

It is therefore a pleasant change to read, in the September number, a letter from Mr. H. Francis, who is, evidently, like myself, disgusted at finding letters on this subject appearing month after month in an official publication of the Cape Government: and although it is not overlooked that you, Mr. Editor, are in n[illegible] way responsible for the opinions expressed in the "Correspondence" column, and t[illegible] you invite letters from all on questions of interest, I think it would meet with the [illegible]l of the majority of your readers, could you see your way to exclude the subj[illegible] [illegible]ur Journal, until at least, there is something more to go on than "the unsup[illegible] [illegible] the operators."

Thanking you if you are able to publish this protest.—You[illegible]

ANOTHER SCEPTIC.

Vryburg, 25th September.

"Another Sceptic" is too severe. No advantage can be gained by arbitrarily suppressing such a discussion, and some good may yet result if the subject is fully debated.

The Rearing of Goslings and Ducklings.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I noticed in the October number of this *Journal* an enquiry by Mr. W. von Meyer on the above subject, and the following remarks may be of use, viz.:—The ordinary tame goose in this country is a descendant of the grey wild goose of Europe (*Anas anser ferus L.*), which breeds on the margin of lakes and swamps; the goose sits 26—28 days; the goslings are led by the goose the second day after leaving the shell to the water, and trained to look for food in the water and upon the land. The tame goose does the same, if allowed to make her nest in the bank of a river or reedy vlei. Goslings and ducklings want shade, and the hot sun kills them quickly. The best food to give them is bran and oatmeal, lettuce and lucerne as green feed. Above all, ducklings and goslings should not be allowed to run about too much, especially in wet weather, as they will keep on running in the wet grass until they are dead. We here have no difficulty in rearing goslings, as there is plenty of shade from trees and shrubs about.—Yours, &c.,

C. C. HENKEL, J.P.,
Late Conservator of Forests.

Umtata, October 31.

Poison for Jackals.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Under the above heading "Farmer," in your issue of this month, wishes to hear what the general opinion is with regard to the pink strychnine supplied by Government. The strychnine is good, and I understand that it is coloured pink to prevent its being mistaken for anything else. Meat absorbs the poison, and a bait the size of a turkey's egg is far too large, as a jackal cannot swallow so much at a gulp, but has to chew it, and so gets the bitter taste of the strychnine.

If "Farmer" will try the following plan he will meet with better success. Take the fat from round the belly of a sheep or goat, pound it to toughen it; then for one pill take a piece half the size of a pigeon's egg, press a hollow into it with the finger, put in one-third of what can be piled on a tickey. Carefully press the fat over the poison so as to get it well covered, make as many pills as are required, then pass them through a flame, to destroy all trace of handling, and put them into any convenient receptacle. Make a drag with a dead lamb or kid, a piece of meat, or the paunch of a sheep, and along the drag at intervals of not less than one hundred yards drop a pill without touching it with the hands—a large pin, a penknife, or a pointed stick do well for the purpose. It is best to drag from horseback.

I have never failed to get rid of a troublesome jackal, but in most cases I do not find the dead jackal, and the reason for not finding the dead jackal I believe is that fat digests slowly enough to give the jackal time to get away, but the jackal ceases to trouble, and that is the important thing.

If poisoning were done systematically throughout the whole country the results would be most satisfactory, but so many people will not lay poison on account of the risk of killing their dogs, or if they do poison, it is only in a half-hearted way.—Yours, &c.,

ANOTHER FARMER.

Burghersdorp, October 31.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I read in the October *Journal* that 'Farmer" would like to know whether the pink poison supplied by Government is good or not: I shall give you my experience and opinion. If you think it is at all likely to benefit the public you can publish it with pleasure. Years ago I used to use pink poison (Government poison), and found I hardly ever killed a jackal, even dogs recovered sometimes. Since then I have bought Jacob Hulles' white poison. I will give you some experiences. When I was on trek in Steynsburg I got "veld" for a month on one farm, and in that month I cut off nine jackals' tails. On the farm Bultfontein, Beaufort West, I cut off seventeen tails in three months. On my farm Canariefontein I killed seven in the first three months, five with this poison and two trapped. We hardly see a jackals' spoor or hear them now, and when I first came here they used to shout three at a time.

Dose:—Grind the poison fine; use about one-fifth of as much as will go on a tickey. I always use the stomach fat of a sheep. Spread it on a box and cut it in squares, and put the poison on and roll it up, so that when round it is about as big as a small pigeon egg, and throw them along the roads and footpaths. Every dog that I poison dies, and there are about ten lying on this farm at present. Jacob Hulles' poison can be bought at the Victoria West Handel Maatschappij, Victoria West, at five shilling an ounce bottle. It is well worth the money. I would like to add more of my experiences, but I fear the letter is already too long. My opinion is most people put too much poison in a dose, and the jackals taste it and hide it under the ground; and also the pill is made too large. They ought to be able to swallow it without chewing it first.—Yours, &c.,

AUSTEN JACKSON,
Carnarvon District.

Victoria West, October 28.

NOTES ON THE WEATHER OF SEPTEMBER, 1907.

By CHARLES M. STEWART, B.Sc., Secretary to the Meteorological Commission.

Mean atmospheric pressure slightly below the average; a monthly temperature higher than usual, but a mean rainfall of only about three-quarters the normal depth; an increased amount of cloud, practically daily local fogs; some severe killing frosts about the beginning and end of the month, causing considerable damage to fruit crops; a few strong winds, with a moderate number of hot winds; an increase in the number of thunderstorms, of fairly wide distribution on the 17th, with some hail and local falls of snow, were the leading features of the weather of September.

DIVISION.	Mean Rainfall (1907).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	3·82	10	3·55	10	+0·27	+ 8
South-West ...	2·57	6	1·91	6	+0·58	+ 29
West Coast ...	1·2	4	0·74	4	+0·48	+ 65
South Coast ...	1·44	7	2·26	7	—0·82	— 36
Southern Karoo ...	0·14	1	0·83	3	—0·69	— 83
West Central Karoo ...	0·31	2	0·53	2	—0·22	— 42
East Central Karoo ...	0·08	1	0·96	2	—0·88	— 92
Northern Karoo ...	0·42	2	0·42	2	—0·00	— 0
Northern Border ...	0·36	2	0·15	1	+0·21	+140
South-East ...	0·60	4	2·14	6	—1·54	— 72
North-East ...	0·97	4	0·99	3	—0·02	— 2
Kaffraria ...	1·34	5	2·05	5	—0·71	— 35
Basutoland ...	1·92	5	1·22	4	+0·70	+ 57
Orange River Colony...	1·35	5	0·73	2	+0·62	+ 85
Durban (Natal) ...	2·89	11	3·49	...	—0·60	— 17
Bechuanaland ...	2·14	4	0·40	1	+1·74	+435
Rhodesia ...	0·02	1	0·16	1	—0·14	— 88

Precipitation.—The mean rainfall, deducted from the records of 347 gauges, amounted to 1·20 ins. falling on 4 days, being 0·47 ins. or 28 per cent. less than the average. Compared with the previous month, there was a general increase in the amounts recorded except over the Southern and East Central Karoos, while the accompanying table shows that there was an excess of rainfall above the average in the West and South-West, as well as over the Northern Border, Basutoland, the Orange River Colony and Bechuanaland. The excess varied from 8 per cent. over the Cape Peninsula to 435 per cent. in Bechuanaland, where the rains appear to have set in unusually early. The deficits over the other divisions were very large in most instances, varying from *minus* 2 per cent. over the North-East to *minus* 92 per cent. over the East Central Karoo. The rains which fell about the middle of the month were of considerable benefit to crops in the districts affected, but drought seems to be seriously affecting parts of the South-East division and the Northern Karoo. Absolute drought, however, prevailed throughout the month at only 27 of the 347 stations, although partial drought (0·01—0·50 ins.) affected an additional 107 stations. Of the remainder, 66 had 0·51—1 in.; 79 had 1·01—2 ins.; 41 had 2·01—3 ins.; 10 had 3·01—4 ins.; 9 had 4·01—5 ins.; 4 had 5·01—6 ins. The remaining four (4) with over 6 ins. were St. Michael's (Table Mountain), with 6·41 ins.; Bishopscourt, with 6·97 ins.; Waai Kopje, with 7·18 ins.; whilst the maximum of 7·32 ins. was registered at Newlands (Montebello). Quantities exceeding 4 ins. were confined to stations in the Cape Peninsula and South-West divisions. The maximum amounts recorded in 24 hours were mostly small, although 3·45 ins. were recorded at Vygeboom's River on the 12th. Of the remaining 325 furnishing particulars, 26 had "Nil," 169 had 0·01—0·50 ins.; 80 had 0·51—1 in., 44 had 1·01—2 ins., and 5 had 2·01—3 ins. Of these last, the largest was 2·40 ins. at

Ceres on the 14th. These large amounts occurred at stations in the Cape Peninsula and the South-West, with the exception of Setlagoli, where 2·14 ins. were registered on the 19th. The dates of maximum precipitation were mostly the 12th and 13th in the West, and the 18th over the rest of the country. There was a marked increase in the number of *Thunderstorms* reported compared with last month, 127 cases in all being noted as occurring on 14 days—3rd, 7th, 10th, 12th to 14th, 17th to 20th, and 27th to 30th—most widely, however, on the 18th and 17th. *Hail* fell at 25 stations in connection with these thunderstorms on 10 days, chiefly the 18th. No damage was reported from this cause. *Sleet* occurred at 6 stations on 4 days, and *Snow* at an equal number of stations on three days—viz., Sutherland on the 12th, Fort Fordyce on the 13th, and De Kruis, Doutsah, Hogsback, and Table Mountain on the 14th.

Temperature, Cloud and Wind.—The mean monthly temperature of all stations was 59·3° or 1·5° higher than the average, and 3·2° warmer than in August. The mean maximum (71·3°) was 1·3° and the mean minimum (47·4°) 1·9° higher than the average, causing a reduction of 0·6° in the mean daily range. Generally speaking, the mean temperature was 0·5°—1·5° warmer than usual, the excess varying between 3·3° at Port Nolloth, and 0·0° at Kokstad. The only exceptions to this statement were inland portions of the South Coast and the Southern Karoo between Uitenhage and Heidelberg, where the means were mostly about half a degree lower than the normal, as was also the case at Mohalie's Hoek, Hope Fountain, Lovedale, and the coast stations of East London and Port St. John's. The mean day temperatures were similarly affected, being usually from 2·3 degrees warmer than usual, the excess, however, varying between 5·6° at Port Nolloth and 0 2° at Lovedale. Deficits in the maximum temperatures were met with at stations in the same areas as in the case of the mean monthly temperatures ranging from 2·0° at Heidelberg to 0·2° at Amalienstein. The mean minima were mostly about the average along the coasts, the differences being commonly about 0·5° above or below the normal, the excess, however, increasing to more than three degrees in the interior. The nights were about half-a-degree colder than usual over that portion of the Colony between the Winterberg-Kologha range and the Coast, and from East London to Dunbrody. The mean warmest station was Kimberley, with 63·8° and the mean coolest Hanover, with 54·7°, a difference of 9·1°. The mean maxima ranged from 59·2° at Disa Head to 79·8° at Kenhardt and Kimberley, while the mean minima varied between 55·5° at Port St. John's and 37 6° at berley, while the mean minima varied between 53 5° at Port St. John's and 37·6° at Hanover. The highest readings of the thermometer were most commonly recorded during two warm spells from the 7th to 9th and 23rd to 26th, although maxima were recorded on several other dates, viz., 4th, 5th, 12th, 13th, 18th, 29th and 30th at a few stations. The lowest temperatures were mostly registered during two cold periods lasting from the 1st to the 3rd, and from the 13th to the 17th, although isolated minima also occurred on the 5th and 24th. The mean value of the highest readings for the month was 88·9°, or 4 4° higher than in August, while the corresponding value of the lowest temperatures was 35·4°, or 4·0° higher than for the preceding month. There was thus a mean monthly range of 53·5°, or 0·4° more than during the previous month. The extreme values for the month were 104·5° registered at Main on the 12th, and 23·0° recorded at Hanover on the 1st and 16th, showing an extreme monthly range over all stations of 81·5°. The *Frosts* during the month appear to have caused serious damage to fruit over the greater part of the country, more particularly those occurring on the mornings of the 11th and 14th to 16th. Thus at Vosburg, it is stated that about 90 per cent. of all stone fruit and about 25 per cent. of grain have been killed by frost; at Carnarvon Farm the frost of the 16th, besides destroying most of the fruit, killed oats, acacia and the bloom of other trees. The damage caused by this means although considerable would appear to have been less extensive at Vruchtbaar, Van Wyk's Vlei, New Bethesda, and elsewhere. The 66 instances reported of this phenomena were distributed over 15 days of the month, viz., 1st to 3rd, 9th, 11th, 13th to 17th, 20th to 23rd, and 26th, but most widely on the 1st and 14th to 16th.

The mean pressure at the Royal Observatory (30·13 ins.) was 0·01 in. lower than usual. The mean amount of *Cloud* (43 per cent.), although 11 per cent. higher than during August, was considerably below the average at most stations. Thus over the Cape Peninsula it was most about 20 per cent. less than usual, and 5 per cent. less along the coasts, except at Port St. John's and East London, where the skies were cloudier than usual. There was also an excess of cloud at most of the inland stations in the South-East, Kaffraria, Northern Karoo, and the High Veld by 5·10 per cent., and at Hope Fountain, in Rhodesia. This meteor was fairly uniformly distributed, being generally about 50 per cent. along the coast, and 30 to 40 per cent. inland. The *Skies* were most obscured (67 per cent.) at Danger Point and least (20 per cent.) at Groot Drakenstein. *Fogs* and *Mists* were more numerous than during August, 135 instances being noted on 29 days, but most numerously on the 6th, 20th, 21st, 27th and 28th. The prevailing *Winds* were Easterly at Port Nolloth, Southerly over the Cape Peninsula and along the coast to Concordia (Knysna), further east, and over a good part of the interior they were mostly North-Westerly (North to West); but North-Easterly at Durban, Kokstad and Kimberley and South-Easterly at Hope Fountain.

Aliwal North and Kenhardt. The excesses were mostly small, the winds being fairly equally divided between those having an Easterly and those with a Westerly component. The mean *Force* of these morning winds was somewhat greater than last month, being 1·82 on the Beaufort Scale, corresponding to a mean velocity of 12·1 miles per hour. The morning observations at the Royal Observatory show a slight excess of S.S.E., Southerly, South-Westerly, and North-Westerly winds; while calms were 15 per cent. more frequent than usual; there was a total absence of wind from points between N.N.E. and E.S.E., and from West and W.S.W., and a decreased frequency of all other winds, more particularly of South-Easterly and W.N.W. breezes. The mean wind-force at this station, 1·47 on the Beaufort Scale or about 10·4 miles per hour, was somewhat less than usual by 1·4 mile per hour. Strong winds were of more frequent occurrence than during August, being reported as attaining the force of a *Gale* on 38 occasions on 16 days of the month, principally during the first half of the month and more particularly on the 12th and 13th. On the latter date some damage was caused to roofs of houses, gardens, etc., by a Westerly gale at Uitenhage and New Bethesda. *Hot Winds* were reported on 8 days from 16 stations, chiefly on the 8th, 12th and 17th; *Duststorms* occurred at 10 places on an equal number of days.

TEMPERATURE, SEPTEMBER, 1907.

Stations.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	67·2	49·1	58·2	91·7	23	37·6	15
Simonstown ...	69·3	53·4	61·3	93·5	24	44·0	15
Table Mountain (Disa Head)	59·2	44·9	52·0	80·5	30	34·0	14
Wynberg (St. Mary's) ...	68·8	48·3	58 6	95·0	26	37·0	14
Groot Constantia ...	66·4	49·6	58·0	90·0	23 & 24	40·0	5, 13, 14 & 15
Groot Drakenstein ...	70·8	47·9	54·4	93·4	24	35·2	15
Danger Point ...	61·9	49·7	55·8	70·0	24	40·0	3
Elsenberg (Agri. College) ...	68·8	44·8	56·8	90·4	24	34·8	15
Port Nolloth ...	69·8	47·4	58·6	95·0	24	37·5	15
Concordia (Knysna)	68·6	50·5	59·5	92·2	24	39·8	15
Port Elizabeth (Emerald Hill)	69·1	52·7	60·9	83·0	4	45·0	15 & 16
Port Elizabeth (Harbour) ...	67·5	53·3	60·4	84·0	25	44·0	17
Dunbrody ...	79·6	45·3	62·4	98 5	25	32·5	3
Cape St. Francis ...	65·0	53·0	59·0	70·0	25	41·0	15
Cape Agulhas ...	62·7	52·4	57·5	83·0	24	41·0	15
Uitenhage ...	76·0	46·6	61·3	93·9	25	35·0	3
George (Plantation) ...	67·4	48·5	57·9	93·0	24	39·0	15
Heidelberg ...	74·0	47·1	60·6	95·0	24	35·0	15 & 16
Van Staaden's River ...	66·2	48·3	58·8	91·0	24	33·0	2
Amalienstein ...	74·5	43·0	58·7	93·0	25	31·0	16
Hanover ...	71·8	37·6	54·7	84·0	29	23·0	16
Murraysburg ...	73·3	42·3	57·8	87·0	30	25·0	15
Kenhardt ...	79·8	45·8	62·8	94·0	29	28·0	16
Kimberley ...	79·8	47·9	63·8	92·9	7	34·9	16
Stutterheim ...	72·4	48·5	60·4	91·3	8	36·0	16
Lovedale ...	75·7	45·9	60·8	93·0	25	34·0	15 & 16
Bedford ...	73·8	44·5	58·1	92·0	9	30·0	15
King William's Town ...	78·8	47·6	63·2	101·0	8	35·0	15
East London (West Bank) ...	67·5	54·1	60·8	76·0	18	46·0	16
Sydney's Hope ...	78·6	49·4	61·5	92·0	8	37·0	14
Evelyn Valley ...	67·8	45·9	56·8	86·0	8	33·0	15
Palmietfontein ..	73·4	43·1	58·2	83·0	8	28·0	1
Aliwal North ...	75·0	43·3	59·2	86·0	7	26·5	1
Rietfontein (Aliwal North) ..	69·8	41·8	55·8	80·2	8	28·2	1
Kokstad (The Willows) ...	71·2	42·3	56·8	87·3	7 & 8	28·8	1
Port St. John's ...	71·6	54·5	63·5	77·0	25	45·0	1
Umtata ...	76·5	49·0	62·8	97·0	8	34·0	1
Main ...	74·9	47·7	61·3	104·5	12	35·5	1
Tabankulu ...	73·1	48·2	60·6	89·4	5	36·0	1
Teyateyaneng ...	70·7	41·7	56·2	82·0	9	30·0	1, 14 & 16
Mohalie's Hoek ...	70·1	40·6	55·4	82·0	9	28·0	2
Hope Fountain ...	78·3	52·3	65·3	92·4	13	45·3	24
Means ...	71·3	47·4	59·3	88·7	...	35·3	...
Extremes ...	...	...	...	104·5	12	23·0	16

OBSERVERS' NOTES.—SEPTEMBER, 1907.

Vruchtbaar.—The steady soaking rains on the 12th and 13th were very welcome indeed. On the 11th we had a little frost which has done much harm to fruit trees just in blossom at the time. The first crop in most varieties is below the average.

Kersefontein.—The rain during the second week has saved the crops of the district.

New Bethesda.—Terrific North-Westerly wind on the 13th; houses unroofed. Bitterly cold and sharp frost on the 14th and 15th; fruit and crops badly damaged. Rain badly wanted.

Theefontein.—Frosts occurred on 1st, 2nd, 3rd, 11th, 14th, 15th and 16th—last three with ice—killing fruit blossom. Winds light and variable.

The Meadows.—Locusts are still about in these parts. The weather has been very promising since the 18th but very little rain has fallen. Crops and stock are doing well.

Vosburg.—Heavy Northerly and North-Westerly wind on the 12th, turning suddenly to South-East. Heavy frost during the night; about 90 per cent. of all stone fruit and about 25 per cent. of grain killed by frost.

Van Wyk's Vlei.—Bees a nuisance, since beginning of month. The high wind of the 13th and subsequent frosts did considerable damage to fruit trees and crops. Crops now recovering from effects.

Alexandria.—Crops suffering severely from drought.

Fort Beaufort.—Country parched and dry.

Sunnyside.—The continued drought is getting serious. Cattle are thin, and crops look a failure. No early potatoes or mealies. The oats are "piping" and are six inches high.

Lauriston.—Farmers' prospects very good indeed. Plenty of grass, stock in excellent condition, crops looking very well. No locusts. Lambing just commenced.

Kokstad.—Country looking quite green after rains. Heavy fogs in mornings.

Groot Drakenstein.—Mean temperature of month 1·3° below the average. Mean for 1st, 21st, 53·7° or 4·4° below average (and colder than any month during the present year). Mean for 22nd, 30th 72·5 or 14·4° above the average (about the February average). Rainfall 0·91 inches above the average, which reduces the deficit on the year to abut 3¼ ins.

Uitenhage.—Storm on 13th from West, wind and rain, causing some damage to roofs, gardens, etc.

Kokstad (The Willows.)—Spring has set in with hopeful aspect. Good rains—not cold—have fallen and vegetation is in an advanced stage. There have been two or three frosts but not severe. An unusually heavy gale visited us on the 13th and did some damage to trees.

Carnarvon Farm.—Very severe frost (10°) occurred on 16th, which destroyed most of the fruit and killed the oak, acacia, and bloom of other budding trees. Large quantities of grain dormant and will not come up until an inch of rain falls. Locusts are about, though not in great numbers. Lucerne being largely planted—several farmers in the district having over 100 acres in potatoes—an absolute drug, 2s. to 3s. per 100 lbs.

Sept.	Rain.	Frost.	Windy Days.	Cloudless Days.
1901	2·25	2	10	0
1902	1·08	4	20	1
1903	0·00	11	13	3
1904	0·38	11	20	4
1905	3·58	10	6	0
1906	1·94	6	8	3
1907	0·85	5	10	4

RAINFALL, SEPTEMBER, 1907.

I. CAPE PENINSULA:

Station	INS.
Royal Observatory (a) 12 in. gauge	1·71
Cape Town, Fire Station ...	2·20
Do. South African College	2·78
Do. Molteno Reservoir ...	2·89
Do. Platteklip ...	4·19
Do. Signal Hill ...	1·88
Do. Hospital ...	
Sea Point, The Hall ...	1·97
Do. Attridge ...	
Camp's Bay	2·11
Table Mountain Disa Head ...	3·54
Do. Kasteel Poort ...	5·10
Do. Waai Kopje ...	7·18
Do. St. Michael's ...	6·41
Devil's Peak Blockhouse ...	
Do. Nursery ...	
Do. Lower Gauge ...	
Woodstock, The Hall ...	2·44
Do. Municipal Quarry ...	3·79
Do. do. Nipher's Shield	4·19
Newlands, Montebello ...	7·32
Claremont, Carrigeen ...	
Bishopscourt	6·97
Kenilworth	5·88
Wynberg, St. Mary's ..	4·92
Groot Constantia	5·96
Tokai Plantation	4·55
Plumstead, Culmwood ...	4·80
Muizenburg (St. Res.) ...	
Fish Hoek	
Simon's Town, Wood ...	3·55
Do. Gaol ...	3·11
Cape Point	1·26
Blaauwberg Strand	
Robben Island	1·58
Durbanville	
Maitland Cemetery	1·83
Tamboer's Kloof	2·52
Woodhead Tunnel	4·83
Lower Reservoir	3·11

II. SOUTH-WEST:

Station	INS.
Eerste River	
Klapmuts	2·75
Stellenbosch, Gaol	4·27
Somerset West	2·68
Paarl	2·60
Wellington, Gaol	2·19
Do. Huguenot Seminary	2·18
Groot Drakenstein, Weltevreden	3·86
Porterville Road	2·95
Tulbagh	2 59
Ceres Road	
Kluitjes Kraal	2·24
Ceres	4·31
The Oaks	
Rawsonville	1·93
Caledon	2·94
Worcester, Gaol	1·45
Do. Meiring	
Do Station	

II. SOUTH-WEST (*con.*):

Station	INS.
Hex River	1·97
De Doorns	
Karnmelks River	2·04
Lady Grey, Division Robertson .	0·74
Robertson, Gaol	1·82
Do. Govt. Plantation ...	1·19
De Hoop	
Montagu	0·98
Danger Point	1·34
Vygebooms River	5·98
Elgin Plantation	4·44
Elsenberg Agricultural College	2·44
Berg Rivier Hoek	
Wemmer's Hoek	
Roskeen	2·32
Vruchtbaar	2·70

III. WEST COAST:

Station	INS.
Port Nolloth	
Do. (Lieut. Barber) ...	0·15
Anenous	0 37
Klipfontein	0·49
Kraaifontein	0·57
O'okiep	
Springbokfontein	1·62
Concordia	
Do. Kraphol	0·84
Garies	
Lilyfontein	2·38
Van Rhyn's Dorp	0·95
Clanwilliam, Gaol	0·55
Do. Downes ...	
Dassen Island	0·95
Kersefontein	1·54
The Towers	1·85
Abbotsdale	
Malmesbury	1·95
Piquetberg	2·03
Zoutpan	1·57
Wupperthal	1·47
Welbedacht	

IV. SOUTH COAST:

Station	INS.
Cape Agulhas	1·28
Bredasdorp	2·59
Swellendam	2·31
Potberg	
Zuurbrak	3·19
Grootvaders Bosch	
Heidelberg	1·22
Riversdale	1·26
Melkhoutfontein	
Vogel Vlei	0·40
Geelbek's Vlei	
Mossel Bay	0·84
Great Brak River	0·73
George	1·26
Do. Plantation	1·11
Do. Woodifield	
Eseljagt	

IV. SOUTH COAST (*con.*):

Station	Ins.
Millwood	1·52
Sourflats	1·25
Concordia	2·43
Knysna	1·46
Buffel's Nek	2·07
Plettenberg Bay	1·66
Harkerville	...
Forest Hall	...
Blaauwkrantz	1·69
Lottering	2·26
Storm's River	...
Witte Els Bosch	2·50
Humansdorp	3·41
Cape St. Francis	2·12
Hankey	...
Witteklip, Sunnyside	1·75
Van Staden's, Intake	1·79
Do. On Hill	1·45
Kruis River	...
Uitenhage, Gaol	0·44
Do. Park	0·37
Do. Inggs	0·34
Armadale, Blue Cliff	0·15
Dunbrody	0·20
Port Elizabeth, Harbour	0·65
Do. Victoria Park	...
Do. Walmer Heights	1·54
Shark's River, Nursery	1·46
Do. Convict Station	1·42
Tankatara	...
Centlivres	0·11

V. SOUTHERN KAROO:

Station	Ins.
Verkeerde Vlei	...
Bok River	...
Triangle	...
Touws River	...
Do. D.E. Office	...
Pietermeintjes	...
Grootfontein	...
Ladismith	0·44
Amalienstein	0·20
Seven Weeks' Poort	...
Calitzdorp	0·27
Oudtshoorn	0·00
Vlakte Plaats	...
Uniondale	0·00
Kleinpoort	...
Glenconnor	0·05
Rust en Vrede	...

VI. WEST-CENTRAL KAROO:

Station	Ins.
Matjesfontein	...
Laingsburg	...
Prince Albert Road	...
Fraserburg Road	...
Prince Albert	0·22
Zwartberg Pass	1·65
Booi's Kraal, Beaufort West	...
Beaufort West, Gaol	0·40
Dunedin	...
Nel's Poort	0·02
Camfers Kraal	0·03
Lower Nel's Poort	...
Krom River	0·18
Baaken's Rug	0·03
Willowmore	0·25
Rietfontein	...
Steytlerville	...
Lemoenfontein	0·20

VII EAST-CENTRAL KAROO:

Station	Ins.
Buffels Kloof	...
Aberdeen, Gaol	0·00
Do. Bedford	...
Corndale	0·00
Aberdeen Road	...
Klipplaat	...
Winterhoek	...
Klipdrift	0·00
Kendrew, Holmes	...
Do	0·00
Graaff-Reinet, Gaol	0·27
Do. Eng. Yard	0·28
Do. College	...
New Bethesda	0·00
Roodebloem	0·04
Glen Harry	0·00
Wellwood	0·05
Do. Mountain	...
Bloemhof	0·05
Jansenville	0·00
Patrysfontein	...
Bethesda Road	0·00
Afrikander's Kloof	...
Roode Hoogte	...
Toegedacht	0·00
Klipfontein	...
Cranemere	...
Pearston	0·20
Darlington	...
Walsingham	...
Arundale	...
Doornbosch, Zwagershoek	...
Middlewater	0·00
Somerset East, Gaol	0·47
Do. Do. College	...
Longhope	...
Cookhouse	...
Middleton	0·06
Spitzkop, Graaff-Reinet	0·05
Bruintjes Hoogte	...

VIII. NORTHERN KAROO:

Station	Ins.
Calvinia	0·52
Middlepost	...
Brandvlei	...
Onderste Doorns	...
Sutherland	0·68
Fraserburg	0·34
Scorpions Drift	...
Rheboksfontein	...
Klein Vlei	...
Carnarvon	0·00
Loxton	...
Beyersfontein	...
Wagenaars Kraal	...
Brakfontein	...
Victoria West	0·05
Omdraais Vlei	...
Doornkuilen	0·00
Britstown	0·52
Wildebeestkooi	0·50
Murraysburg	0·36
De Kruis, Murraysburg	0·24
Richmond	0·22
De Aar	...
Middlemount	...
Hanover	0·45
Theefontein	0·56

VIII. NORTHERN KAROO (*con.*):	INS.
Zwagersfontein	
Philipstown	0·50
Boschfontein	
Petrusville	1·22
The Willows, Middelburg ...	0·12
Naauwpoort	0·43
Middelburg, Gaol	0·20
Do.	
Middelburg Government Farm ...	
Jackalsfontein	0·50
Ezelpoort	0·52
Plaatberg	0·37
Grape Vale	0·75
Ezelfontein	0·25
Roodepoort	0·27
Groenkloof	0·44
Vlakfontein	0·33
Vogelsfontein	0·80
Plaatfontein	0·47
Colesberg	0·82
Tafelberg Hall	0·15
Rietbult, Colesberg Bridge ...	
Fish River	0·16
Varkens Kop	0·32
Culmstock	
Droogefontein	
Stonehills	
Cradock, Gaol	0·55
Witmoss	0·23
Varsch Vlei	
Maraisburg	0·80
Steynsburg Gaol	0·81
Riet Vlei	
Hillmoor	0·76
Quagga's Kerk	
Tarkastad	0·15
Do., Dis. Engineer ...	0·14
Drummond Park	
Glen Roy	
Waverley	0·31
Gannapan	
Montagu...	
Grape Vale	
Rietfontein, Colesberg ...	0·58
Schuilhoek	0·30
Vosburg	0·00
Zwavelfontein	0·08
Holle River, Colesberg ...	1·01
The Meadows, Schoombie ...	0·98
Cradock Station	0·45

IX. NORTHERN BORDER:	
Pella	
The Halt	0·00
Keimoes	
Kenhardt	0·00
Upington	0·00
Trooilapspan	
Van Wyk's Vlei	0·00
Prieska	
New Year's Kraal	0·00
Dunmurry	0·67
Karree Kloof	0·20
Griquatown	0·11
Campbell	
Douglas	0·23
Avoca, Herbert	
Hope Town	
Orange River	

IX. NORTHERN BORDER (*con.*):	INS.
Newlands, Barkly West ...	0·79
Barkly West	0·62
Bellsbank	1·14
Kimberley Gaol	0·80
Do. Stephens ...	0·76
Strydenburg	0·00
Rietfontein, Gordonia ...	0·20
Douglas, Vos	0·20

X. SOUTH EAST:	
Melrose, Div. Bedford ...	0·17
Dagga Boer	0·12
Fairholt	0·22
Lynedoch	
Alicedale	
Cheviot Fells	0·51
Bedford, Gaol	0·61
Do. Hall	0·49
Sydney's Hope	0·44
Cullendale	
Adelaide...	0·14
Atherstone	0·42
Alexandria	1·09
Salem	0·14
Fort Fordyce	1·12
Fountain Head	
Graham's Town Gaol ...	0·58
Do. Do.	
Heatherton Towers	0·00
Sunnyside	0·55
Vischgat...	
Fort Beaufort	0·16
Katberg	1·25
Balfour	0·40
Seymour...	0·31
Glencairn	0·62
Alice	0·22
Lovedale...	0·40
Port Alfred	0·57
Hogsback	2·06
Peddie	0·20
Exwell Park	
Keiskamma Hoek	0·43
Cathcart Gaol	0·30
Cathcart, Forest	0·21
Cathcart...	
Thaba N'doda	0·95
Evelyn Valley	2·27
Crawley	
Thomas River	0·24
Perie Forest	0·96
Forestbourne	1·52
Isidenge	0·89
Kologha	1·15
King William's Town Gaol ...	0·18
Do. Do., Dr. Egan	0·33
Stutterheim, Wylde... ...	
Do., Besté	0·76
Fort Cunynghame	1·06
Dohne	
Kubusie	
Quacu	0·82
Blaney	0·25
Kei Road	0·86
Berlin	
Bolo	
Fort Jackson	0·00
Prospect Farm, Komgha ...	
Komgha Gaol	0·65
Chiselhurst	
East London West	0·53

X. SOUTH EAST (*con.*):	INS.
East London East	...
Cata	1·64
Wolf Ridge	1·77
Dontsah	0·72
Mount Coke	0·20
Blackwoods	0·11
Albert Vale, near Bedford	0·16
Heatherton (Irrigation)	0·00

XI. NORTH-EAST:	
Venterstad	1·52
Mooifontein	0·25
Burnley, Cyphergat	...
Burghersdorp Gaol	1·23
Ellesmere	1·37
Molteno	0·95
Lyndene	0·95
Cyphergat	1·25
Thibet Park	...
Sterkstroom Station	0·95
Do. Gaol	0·98
Rocklands	0·31
Aliwal North Gaol	1·17
Do. Brown	...
Do. Dist. Engineer	1·20
Buffelsfontein	1·14
Hex's Plantation	...
Poplar Grove	...
Carnarvon Farm	0·85
Halseton	...
Jamestown	1·22
Whittlesea	0·32
Queenstown Gaol	0·47
Do. Beswick	...
Rietfontein, Aliwal North	0·96
Middlecourt	...
Dordrecht	1·18
Tylden	0·27
Nooitgedacht	...
Herschel	1·82
Lady Grey	0·93
Lauriston	1·06
Lady Frere	...
Contest, near Bolotwa	0·55
Sterkspruit	1·64
Doornkop	...
Avoca, Barkly East	...
Keilands	0·34
Palmietfontein	1·63
Barkly East	0·66
Blikana	1·28
Glenlyon	...
Rhodes	...
Gateshead	...
Cliftonvale	...
Albert Junction	0·97
Queenstown, District Engineer's Office	...
Hughenden	1·30
Glenwallace	...
Indwe. District Engineer's Office	0·82
Bensonvale Inst., Herschel	...
Cathcart, Queenstown	...
Royal, Div. Albert	...
Cathcart Station	0·27
Lady Grey Station	0·50
Dordrecht, D E.'s Office	0·74
Stormberg Junction, D.E.	1·73
Broughton, Molteno	1·17

XII. KAFFRARIA:	INS.
Ida, Xalanga	...
Slaate, Xalanga	1·53
Cofimvaba	0·79
Tsomo	0·60
N'qamakwe	0·27
Main	0·63
Engcobo	1·32
Butterworth	0·38
Woodcliff	...
Kentani	0·61
Maclear	1·81
Idutywa	0·22
Bazeya	2·58
Willowvale	0·57
Mount Fletcher	2·54
Somerville, Tsolo	0·96
Elliotdale	0·82
M'quanduli	...
Matatiele	...
Umtata	0·85
Cwebe	0·82
Tabankulu	0·50
Mount Ayliff	...
Kokstad	1·79
Do., The Willows	2·13
Seteba	2·34
Flagstaff	1·65
Insikeni	3·23
Port St. John's	0·97
Kilrush, Sneezewood	...
Umzimkulu	0·79
Mandileni	...
Wanstead	...
Cedarville	...
Maclear Station	1·48
Elliot Station	1·35
Tent Kop, Elands Height	2·31

XIII. BASUTOLAND:	
Mafeteng	1·09
Mohalies Hoek	1·46
Maseru	...
Teyateyaneng, Berea	1·47
Moyeni Quthing	2·31
Qacha's Nek	3·26
Leribe	...
Butha Buthe	...

XIV. ORANGE RIVER COLONY:	
Bloemfontein	...
Kroonstad	1·33

XV. NATAL:	
Durban, Observatory	2·89

XVI. TRANSVAAL:	
Johannesburg	...

XVII. BECHUANALAND:	
Taungs	1·76
Vryburg	2·44
Mafeking	2·51
Setlagoli	2·75
Kuruman	1·23
Zwartlaagte	...

XVIII. RHODESIA:	
Hopefountain	0·05
Rhodes Matoppo Park	0·00

XIX. DAMARALAND:	
Walfish Bay	...

DEPARTMENTAL NOTICES.

Regulations governing the Payment of Grants to Societies or Associations towards Prizes at Shows or Competitions, and in aid of Permanent Improvements in or to Show Yards or Premises.

1. For the purpose of these regulations a Society shall mean any combination of persons not less than 25, organised for the purpose of holding periodical shows or prize competitions of live-stock, agricultural produce of all kinds, agricultural machinery and appliances and products of home industries; such shows or competitions to be open to the public under regulations to be framed by the Society.

2. The funds provided by Parliament for Grants to Societies and Associations shall be applied in the following manner, and not otherwise, that is to say:—

A. *As Grants for Prizes at Shows.*

The Funds provided for this purpose shall be paid out to the various Societies holding shows during the year for which such funds are available, on the basis of a distribution as nearly as possible *pro rata* to the amount of prize money actually awarded and paid out in classes recognised under these regulations at each such Society's last preceding show, or, where no previous show has been held, to the prize money awarded and paid out at the show in respect of which a grant is desired by the Society; provided:—

1. That the sum so contributed by the Government shall not exceed five-eighths of the total amount awarded in prizes at the show towards which such contribution is made, for the various classes recognised under these regulations, nor shall the sum payable to any one Society in one year exceed one-eighth of the total sum provided for this service.

2. That prizes in respect of which the Government Grant is awarded shall be paid only for:—

(*a*) The following classes of live-stock, viz.:—Horses, Mules, Donkeys, Cattle, Ostriches, Sheep, Goats, Pigs, and Poultry.

(*b*) Agricultural Produce of all kinds.

(*c*) Agricultural Machinery and Appliances, including farm vehicles.

(*d*) Such products of home industries as the Government may approve.

3. That no grant shall be paid towards more than three separate shows in any one season in respect of the same exhibit in Sub-head 2 (*a*).

4. Payment of such grants shall be authorised upon production to the Civil Commissioner concerned by the Society's duly authorised officer of proof that the Society is duly qualified for a grant under these regulations, and that payments in respect of which the grant is applied for have been actually and *bona fide* made by the Society; provided that the Civil Commissioner may, in lieu of proof that the payment has been made, accept the declaration upon oath of the President or Chairman of the Society that such and such an amount has been awarded in prizes, and will be paid to the respective prize-winners upon receipt of the Government contribution, and that receipts for payment from prize-winners will be produced ~~when~~ payment has been made.

Further, a declaration on oath by the same official of the Society shall be produced to the Civil Commissioner to the effect that the condition imposed under Sub-head 3 has been complied with.

5. For the purposes of this Sub-division (A) the word "show" shall include "competition."

B. *As Grants for Permanent Improvements, in or to Show Yards and Premises.*

1. Whenever funds shall have been provided for this specific purpose, such funds may be distributed on the basis of a contribution on the £ for £ principle towards the cost actually and *bona fide* incurred upon the construction or purchase of buildings or other permanent improvements to or requirements for show grounds or show premises to such Societies as shall have submitted their applications to Government before the 1st of January of the financial year prior to that in which such contribution will be made and shall have received approval thereof. It shall be distinctly understood that the Government will not recognise any claim for a grant, out of the funds provided, towards the cost of any improvements which shall not have received its previous approval in writing.

2. Should any Society, which shall have received contributions from Government funds towards buildings or other permanent improvements or requirements, at any future time cease to exist or discontinue the holding of shows, the right shall be reserved to the Government to claim one-half of the proceeds of sale of such buildings, etc.

Admission of Livestock from the Cape Colony into the Transvaal.

It is hereby notified for general information that Livestock from the Cape Colony are now only admitted into the Transvaal through the following Ports of Entry, viz.:—

Buurmans Drift	Daily.
Christiana	Daily.
Myssymiyani	On Saturday's only.

Owners wishing to cross the Border at other than the abovementioned Ports must make special arrangements with the Principal Veterinary Surgeon, Pretoria, but Equines doing transport work are permitted to enter the Transvaal at any point, provided the owners have obtained a standing permit.

H. B. SHAWE,
Acting Under Secretary for Agriculture.

Department of Agriculture.
Cape Town, 31st October, 1907.

Importation of Horses, Asses and Mules into Great Britain.

It is notified in the *Gazette* for the information of Exporters of Livestock and others concerned that, in terms of an Order, dated 23rd August, 1907, and issued by the Board of Agriculture and Fisheries no horse, ass, or mule, brought to Great Britain from any other country, except Ireland, the Channel Islands or the Isle of Man, shall, from and after the 31st December, 1907, be landed in Great Britain unless it is accompanied by a certificate of a Veterinary Surgeon to the effect that he examined the animal immediately before it was embarked or whilst it was on board the vessel as the case may be, and that he found that the animal did not show symptoms of glanders or farcy.

The Order further enacts that if any horse, ass, or mule is landed in contravention of the Order, the Owner thereof, and the owner and the lessee and the occupier of the place of landing where such animal is landed, and also the owner and the charterer and the master of the vessel from which the same is landed, shall, each according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894, and be liable to a penalty of £20.

H. B. SHAWE,
Acting Under Secretary for Agriculture.

Cape Town, 21st October, 1907.

Abolition of Dip Depots in the Transkei.

It is notified for general information that His Excellency the Governor has been pleased to approve of the abolition of all the Dip Depots established throughout the Transkeian Territories, and Pondoland, East and West, in terms of Section 6 of the Scab Regulations promulgated by Proclamation No. 60 bearing date 19th day of February, 1903, such abolition to take effect on the 30th instant.

H. B. SHAWE,
Acting Under Secretary for Agriculture.

Guano from Government Islands.

It is notified for general information that the price of Guano at the depôts Cape Town, Port Elizabeth, East London, Knysna and Storms River is £6 per ton of 2,000 lbs. or 12s. per bag of 200 lbs. One bag is the smallest quantity which can be purchased.

The guano is of an approximate uniform grade. Rock guano is no longer supplied separately but is mixed with the other collections. *Free railage is also discontinued.*

Remittances in cash, cheque or Post Office Money Order, in advance, must be made or sent: For Guano from Cape Town, to the Superintendent of the Guano Islands, Strand Street; for Guano from the other depôts, to the Depôt Keepers at the places named.

Government Notice No. 1057, dated 20th August, 1906, is cancelled.

H. B. SHAWE,
Acting Under Secretary for Agriculture.

Destruction of Locusts.

It is hereby notified for general information that, until the funds provided by the Government for the destruction of Locusts are exhausted, Government aid will be given towards that purpose, subject to the conditions specified hereunder.

Government Notice No. 1036 of 1905 is hereby cancelled, except in so far as it concerns the issue of orders for Soap by Locust Boards already appointed.

H. B. SHAWE,
Acting Under Secretary for Agriculture.

Cape Town, 10th October, 1907.

Conditions.

1. Government aid will be given in respect of the following articles:—
   (*a*) Blue Mottled Soap.
   (*b*) Sunlight Soap.
   (*c*) Other cheap Soaps.
   (*d*) Spraying Pumps.
   (*e*) Arsenite of Soda.
   (*f*) Sugar or Treacle.
   (*g*) Water Drums.

Spraying Materials.

2. (*a*) Spraying Pumps, Arsenite of Soda, Sugar or Treacle, and Water Drums can be obtained by applicants on loan free of charge from the Resident Magistrate of their District, but the Government does not hold itself responsible for any delay or failure to supply these materials.

(*b*) Each applicant will receive one Spraying Pump, about 10 lbs of Arsenite of Soda, and about 30 lbs. of Sugar or Treacle.

(*c*) It is left to the Resident Magistrate to decide whether it will be preferable to supply an applicant with Treacle or Sugar.

(*d*) A limited number of ten-gallon water drums will be available for issue at the discretion of the Resident Magistrate.

(*e*) Receipts in the subjoined form must be given by applicants to the issuing officer for all materials supplied in terms of the preceding sub-sections:—

I hereby acknowledge to have received from..the undermentioned supplies for destruction of Locusts and undertake to use them for that purpose only, and to return to the Resident Magistrate of this District the Spraying Pump and Water Drum in good order, reasonable wear and tear excepted, and any unused Arsenite of Soda, Sugar or Treacle on the termination of the Locust season or, when called upon during the season by the District Locust Officer or the Resident Magistrate, either to transfer them to some other person to be named or to return them to the Resident Magistrate.

Articles received by me:—
Spraying Pump...
Arsenite of Soda
Sugar
Treacle
Water Drum

Place
Date.
Signature

3. (*a*) Blue Mottled Soap, Sunlight Soap and other cheap soaps can be purchased by applicants on orders signed by the Chairman of a Locust Board, by a Field-cornet or by the District Locust Officer.

(*b*) Two-thirds of the cost of any of these Soaps so obtained will be borne by the Government.

(*c*) The cost of the Soap must be the ruling market rate

(*d*) Storekeepers supplying Soaps on order of Locust Boards, Field-cornets or the District Locust Officer must render to the Resident Magistrate of the District their account for two-thirds of the cost and to applicants direct their account for the remaining one-third cost. To the account for the Government share of the cost, which should be rendered at the end of the month during which the soap is supplied, must be attached the order, which should bear the applicant's receipt for the Soap

LOCUST OFFICERS

4. The Locust Officers enumerated in the Schedule hereto have been appointed to give demonstrations in poisoning Locusts by means of spraying with a solution of Arsenite of Soda and Sugar or Treacle.

Schedule

District	Locust Officer.
Albert (including Molteno)	N. J. van Wyk.
Aliwal North	G. W. Thurston.
Barkly East	G. Middleton.
Bedford	A. Alcott.
Cathcart	W. E. J. Palmer.
Colesberg	T. Bradfield.
Cradock	R. H. Hattingh.
Fort Beaufort (with Victoria East and Stockenstrom)	A. Mildenhall.
Glen Grey (with St. Marks and Tsomo)	E. J. Perry.
Graaff-Reinet	A. van Ryneveld.
Herschel	G. Bretten.
Jansenville	W. Bain.
Mafeking	(To be appointed).
Middelburg	J. H. Potgieter.
Nqamakwe (with Butterworth)	T. E. Moriarty.
Queenstown	A. G. Leach.
Somerset East	H. D. M. Barnett.
Steynsburg	F. S. Hoskin.
Stutterheim	G. H. Jakins.
Tarka	C. Hattingh.
Taungs	P. J. Metrovitch.
Vryburg	W. E. Trollope.
Wodehouse	P. W. Kruger.

Scrub Extermination.

It is hereby notified that application for Scrub Exterminator (Arsenite of Soda) for the eradication of Prickly Pear and Jointed Cactus, accompanied by the necessary remittance, must be made to the Magistrate of the District in which the land to be cleared is situated.

The Scrub Exterminator will be obtainable at any Depôt now and hereafter established for the purpose at a prepaid charge of £2 2s. 6d. (two pounds two shillings and sixpence sterling), per drum containing 112 lbs., delivered at the Depôt.

The Depôts at present established are shewn in the Schedule hereto.

H. B SHAWE,
Acting Under Secretary for Agriculture.

Cape Town, 14th October, 1907.

Schedule.

Aberdeen—Civil Commissioner's Office.
Adelaide—J. Lamont.
Alexandria—Civil Commissioner's Office.
Bedford—Kilfoil Brothers.
Cookhouse—Macdonald Brothers.
Cradock—Civil Commissioner's Office.
Fort Beaufort—Civil Commissioner's Office.
Graaff-Reinet—Goldman & Co.
Grahamstown—J. H. Parker.
Humansdorp—Civil Commissioner's Office.
Jansenville—J. F. Heydenrich, Jansenville; C. Lee, Claremont, Klipplaat.
King William's Town—Civil Commissioner's Office.
Murraysburg—Civil Commissioner's Office
Oudtshoorn—P. Matare.
Port Elizabeth—Civil Commissioner's Office.
Queenstown—Civil Commissioner's Office
Somerset East—Berry & Co., Somerset East; G. Webster, Middleton Nek; C. W. Smuts, Pearston.
Steynsburg—Civil Commissioner's Office.
Steytlerville—Civil Commissioner's Office.
Stockenstrom—Civil Commissioner's Office.
Swellendam—Civil Commissioner's Office.
Tarkastad—Civil Commissioner's Office.
Uitenhage—Sergt. Montagu Walker, Kleinpoort; also Civil Commissioner's Office.
Umtata—Resident Magistrate's Office.
Willowmore—Civil Commissioner's Office; W. Geard, Heuvel Kraal.

DEPARTMENTAL PUBLICATIONS.

The following pamphlets, reprints, etc., are obtainable on application to the Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town. Members of Farmers' and Fruit Growers' Associations applying for same through the Secretaries of these Associations are supplied free of charge.

Agricultural Miscellanea, price 6d. each. Extracts from Vol. I. to V. of *Agricultural Journal.*

Artificial Grasses and Fodder for Stock; Ensilage; Treatment of Cereal and other Crops; Viticulture and Wine Making; Forestry; Locusts and their Destruction; Possible New Industries for Cape Farmers; Dairying; Fruit Culture (6d.).

Agriculture.

Wheat Production in Australia (1s. 6d.) by A. C. Macdonald; *Wheat Production in Australia (1s. 6d.) by W. Halse and J. D. J. Visser ; Hop Cultivation (3d.) translated by A. W. Heywood; *Brak Land in Relation to Irrigation and Drainage (1d.); The Velvet Bean (1d.); Potato Disease (1d.); Scheme of Manurial Experiments (1d.); Leguminous Forage Crops for Trial in Cape Colony (1d.); Sundry Forage Crops for trial in Cape Colony (1d.); Poultry in South Africa: Rearing, Management and Improvement, with notes on Prevalent Diseases and Internal and External Parasites (3d.); The Salt Bushes (1d.); Tobacco Culture by P. Bornemisza (1d.); The Cultivation of Tobacco in the Colony by K. Schenck (3d.); Tobacco Wilt in Kat River Valley (1d.); *The Process and Appliances for the Flue Curing of Tobacco (3d.).

Dairying.

Dairy Breeds by A. C. Macdonald (9d.); *Dairy Industry in Great Britain by A. C. Macdonald (6d.); *Dairy Industry in Denmark (2d.); Ready Reckoner for Cream Testing (1s.); †Dairy and its Products by D. Hutcheon (2d.); *Cheddar Cheese Making (1d.).

Entomology.

The Bont Tick (1d.); Bean Bruchus (1d.); Cabbage Aphis (1d.); Codling Moth in Madeira Fruit (1d.); *Codling Moth (1d.); Fruit Fly (1d.); Fumigation Supplies (1d.); Insect Friends and Foes (1d.); Methods of Locust Destruction (1d.); *Peach Yellows (1d.); Pear Slug, Paris Green (1d.); Remedy for Mestwurmen (1d.); *Spray Calendar (1d.); *Spray Pump Notes (1d.); Scale Insects on Ornamental Trees and Plants (1d.); Two Pine Apple Pests (1d.); Tree Fumigation in California (1d.); Winter Spraying (1d.); Wattle Bag Worm (1d.); Bordeaux Mixture (1d.); Death Head Moth Superstition (1d.); Fumigation under Box Covers (1d.); The House Fly (1d.); New Oak Tree Pest (1d.); Nursery Inspection and Quarantine Bill (1d.); Potato Tuber Moth (1d.); The Codling Moth: Notes on its Life Cycle and Remedies (1d.); Gall Worms in the Roots of Plants (1d.); *The Fruit Fly (with coloured plates), (3d.); Another Introduced Scale Pest (1d.); Washes for Red Scale (1d.); Fruit Fly: Peach Fly Moth (1d.); Lime Salt Wash for Scale Insect (1d.); The Fruit Moth (1d.); Fusicladium of the Apple and Pear (1d.); Mealie Stalk Borer (3d.)—*coloured plate*; Cleaning up Nursery (1d.); Natural Enemies of the Fruit Fly: Report on Investigations in Brazil (1d.); Locust Birds and Locust Poison (1d.); The Brazil Fruit Fly Parasites (1d.); Cyanide Gas Remedy for Scale Insects (3d.); Arsenate of Lead (1d.); The Antestia Fruit Bug (1d.); Caterpillars Destroying Trees (1d.).

**NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.**

Forestry.

British National Forestry (1d.); Botanical Observations on Forests in Eastern Pondoland (1d.); †Elementary Principles of Sylviculture or Woodcraft (1d.); National Forests (1d.); Indigenous Timbers of the Cape (1d.); Misuse of Coal and the Uses of Forests (1d.); Tree Planting for Timber and Fuel (1d.); Tree-Planting for Farmers (1d.).

Fisheries.

Trout and Carp Breeding and Stocking of Streams (1d.); *Methods of Preserving Fish by Smoking (1d.); Portable Floating Hatching Box for Trout Ova (1d.); The Protection of Trout (1d.); The Ocean and its Resources (1d.).

Horticulture.

Fruit Culture in the Gamtoos River Valley (1d.); *Marketing of Fruit (1d.); The Olive at the Cape (2d.); Tomatoes and Fruit for Export (1d.); Citrus Culture in Cape Colony: Report of the Citrus Commission (1d.); *Fruit from Orchard to Buyer (1d.); Netting for Fruit Trees (1d.); Fruit Culture in Argentina (1d.); Vegetables for Exhibition (1d.); Chrysanthemum Rust (1d.).

Veterinary and Animal Industry.

*Anthrax, Charbon, Mitzbrand or Miltziekte (1d.); *Heartwater (1d.); *Malarial Catarrhal Fever of Sheep (1d.); Rinderpest: Dr. Koch's Report (1d.); *Inoculation against Rinderpest (1d.); Dr. Kohlstock's Report on Inoculation for Rinderpest (1d.); *Redwater, Texas Fever or Tick Disease (1d.); *Redwater, Anthrax and Quarter Evil (1d.); *Sheep and Wool (1d.); The Eye and its Diseases (1d.); Husk, Hoose or Parasitic Disease of the Lungs of Cattle, Sheep and Pigs (1d.); Tick Heartwater Experiments (1d.); Indigestion and Diarrhœa in Calves (1d.); Persian Sheep and Heartwater (1d.); Poisoning of Stock (1d.); Retention of the Fœtal Membrane, or Afterbirth in Cows (1d.); Stijfziekte, Lamziekte or Osteo-Malacia and Paralysis (1d.); Tuberculosis and the Use of Tuberculin (1d.); African Coast Fever, with Description of Dipping Tank (3d.); *Rinderpest in South Africa (3d.) by D. Hutcheon; *Fluke or Slak in Liver of Sheep (3d.)—*coloured plate*; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte (1d.); Osteo Porosis (3d.)—*coloured plates*; *Glanders (3d.)—*coloured plate*; *Animal Castration (1d.); *Preventive Inoculation for Redwater (1d.); *Abortion in Cattle (1d.); Treatment for Worms in Domestic Animals (1d.); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia or Pleuro-Pneumonia-Bovum-Contagiosa (1d.); *Swine Fever, Hog Cholera or Pig Typhoid (3d.)—*coloured plates*; Castration of Females and Animals other than the Horse (1d.); Poisoning of Horses by *Ornithogalum Thyrsoides* or Chinkerinchee (*coloured plate*) (3d.); Horse Sickness by D. Hutcheon (2d.); Ticks and African Coast Fever (1d.); Cirrhosis of the Liver in Stock (1d.); Liver Disease among Calves (3d.); The Arsenite of Soda Dipping Mixture (1d.); *Lampas; Preventive Vaccination against Anthrax.

Viticulture.

†Reports on Viticulture (3d.); *Reconstitution of Phylloxerised Vineyards (1s.); Report on Failure of Hanepoot Grapes on American Vines (1d.); The Making of Wine and its By-Products (6d.); How to Treat Wine Casks (1d.); Failure of Vines (1d.); Manufacture of Dry Wines in Hot Countries (3d.); Anthracnose in Constantia (1d.).

Miscellaneous.

Game Seasons (3d.); Land Laws of Cape Colony (1d.); †Monsonia: the Cape Cure for Dysentery (1d.); *Rainfall in South Africa (1d.); Sand Dunes of Gascony (5d.); The Metric System (1d.); South African Stud Book Constitution, Rules, etc. (1d.); Bars in Ostrich Feathers (1d.); *Information regarding the Mining Laws (1s.); The Preservation of Game in Cape Colony.

NOTE.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 26th October, 1907, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	s d	s d	£ s d	s d		
Aliwal North ..	0 12 6	0 17 6	0 15 0	0 4 3	0 5 6	0 7 0	0 12 0	0 7 6	0 3 6	6d. to 9d	7d. to 9d.	4d. to 6d	1/6 to 2/-	0 0 9	£9 9s. to £10 10s.	15/ to 19/-
Beaufort West ..	0 11 3	0 17 6	0 15 0	0 6 6	0 9 6	0 8 0	0 7 6	0 5 6	0 9 0	0 0 7	*4d., 5d.	*4½d.	0 1 7	0 1 3	£17	20/-
Burgersdorp ..	0 11 0	18/6(bag)	27/6(bag)	0 4 9	12/6(bag)	8/-(bag)	15/-(bag)	0 7 6	0 2 6	0 1 0	0 0 8	0 0 6	0 1 4	0 0 10	..	..
Cape Town ..	..	..	..	..	..	0 6 0	0 5 0	0 4 0	0 6 0	..	..	..	0 1 2	0 1 0	..	..
Clanwilliam ..	0 15 0	..	0 16 6	0 10 0	..	0 7 0	0 8 0	..	0 9 0	9d. to 1/-	7d., 8d.	6d., 8d.	0 1 6	6d., 9d.	..	..
Colesberg ..	..	..	..	..	..	..	..	0 6 6	0 6 0	..	..	..	1/- to 1/3	1/2 to 1/6	..	..
Cradock ..	..	..	0 14 6	0 6 6	..	0 5 0	0 5 0	0 6 6	0 7 6	0 0 6	0 0 6	0 0 6	0 2 0	0 1 3	£10	17/6
Dordrecht.. ..	0 7 6	0 15 0	0 10 0	0 4 0	0 6 0	0 4 0	0 5 0	0 3 6	0 3 0	0 1 0	0 0 6	0 0 7	0 1 10	0 0 10	£9	16/-
East London ..	0 7 0	0 11 0	0 9 0	0 5 6	0 8 0	0 5 0	0 5 3	0 5 3	0 5 6	0 1 6	*8d., †7d.	*†0 0 7	0 2 0	0 1 0	£20	35/6
Graaff-Reinet ..	0 8 0	..	..	0 6 0	..	0 5 0	0 5 0	0 7 0	0 4 6	0 0 4	0 0 4	0 0 4	0 1 6	0 0 10	£9	19/-
Graham's Town ..	0 7 0	..	..	0 6 6	..	0 5 6	0 6 9	0 7 2	0 8 4	0 0 8	0 0 6¼	0 0 8	0 2 2½	0 1 0½	..	..
Kimberley ..	0 12 0	0 15 0	0 13 6	0 5 0	0 6 0	0 7 6	0 7 6	0 6 3	8/6 local 4/6 other	0 0 7	0 0 10	0 0 8	..	0 0 11	£10 to £15	16/- to 20/-
King Wm.'s Town..	0 7 6	0 15 3	0 14 0	0 5 6	0 5 6	0 4 0	0 3 6	0 6 0	0 5 6	0 0 7	0 0 5	0 0 6	0 2 0	0 1 0	£16	23/-
Malmesbury ..	0 10 0	0 15 0	0 12 0	0 7 0	..	0 6 8	0 5 0	0 4 0	0 10 0	0 3 0	0 0 6	0 0 6	0 1 3	0 1 0	£12 10s.	21/-
Mossel Bay ..	0 12 6	0 16 0	0 12 6	..	..	..	..	0 5 6	0 16 0	..	..	0 0 8	..	..	..	..
Port Alfred ..	0 12 0	1 2 0	0 17 0	0 7 0	0 11 0	0 8 0	0 8 0	0 6 0	0 10 0	0 0 9	0 0 9	0 0 6	0 1 6	0 0 6	..	..
Port Elizabeth ..	0 8 6	..	..	0 6 3	..	0 4 9	0 6 6	0 6 0	0 10 6	0 0 3	0 0 7	0 0 7	0 1 9	0 1 0	..	..
Queen's Town ..	0 10 0	0 17 0	0 15 0	0 4 6	0 7 6	0 4 0	0 6 6	0 5 0	0 4 0	0 0 9	0 0 7	0 0 6	0 1 9	0 1 0	£12 to £14	18/- to 22/-
Tarkastad.. ..	0 12 0	0 12 6	0 11 6	0 7 6	0 10 0	0 6 6	0 10 0	0 5 9	0 5 0	0 0 7	*0 0 6	*0 0 6	0 1 6	0 1 2	£10	20/-
Vryburg	0 13 0	0 19 3	0 17 0	0 6 0	0 8 0	0 7 6	0 8 0	0 8 9	0 13 0	0 0 7½	0 0 6	0 0 6	0 1 6	0 0 9	£11 to £13	15/- to 17/6
Worcester	0 12 6	0 17 6	0 14 0	0 8 0	0 9 0	0 7 0	0 6 9	0 5 0	0 6 0	0 0 5	*6d. to 9d. †5½d. to 9d.	*5d. to 6d. †5d. to 6d.	0 1 3	0 0 7	£8 10s. to £12 10s.	21/6 to 24/6

NOTE.—A blank space denotes "no transactions. *Colonial †Frozen.

THE PRODUCE MARKET.

CAPE TOWN.

Mr. R. Muller, of Strand Street, Cape Town, reports for the month ending October 31st:—

Ostrich Feathers.—The market has been well supplied with the usual average assortment. The demand for good quality continues, and prices are very firm; but common quality may be said to be easier.

	£	s.	d.	£	s.	d.
Super Primes	17	10	0	35	0	0
Firsts, ordinary to Super	11	0	0	15	0	0
Seconds	8	0	0	10	0	0
Thirds	5	10	0	6	10	0
Femina Super	12	0	0	16	0	0
Femina, Seconds to Firsts	5	0	0	10	0	0
Byocks (fancy)	5	10	0	9	10	0
Long Blacks	3	10	0	7	0	0
Medium Blacks... ...	2	10	0	3	10	0
Short to Medium ...	0	10	0	1	10	0

	£	s.	d.	£	s.	d.
Floss	0	5	0	1	15	0
Long Drabs	2	10	0	4	0	0
Medium Drabs	1	0	0	2	0	0
Short to Medium ...	0	10	0	1	0	0
Floss	0	5	0	1	15	0
White Tails	2	0	0	3	15	0
Coloured Tails	0	10	0	2	10	0
Chicks	0	1	0	0	2	0
Spadonas	2	10	0	5	0	0
Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—During the past month the market has been fully supplied. All good wools, light of condition, have met with a keen demand. There is a strong enquiry for good combing wools, and some high prices have been paid for superior clips. Darling wools have realised up to 11d., Caledon up to 10¾d., Bokkeveld up to 11d., Roggeveld, of which there were offered some very good clips, brought up to 10⅝d. per lb. Many lots from the Calvinia district showed very good quality and light condition, and competition was very keen, prices running up to 9½d. Malmesbury Grease may be quoted from 6½d. to 9½d., according to quality.

	s.	d.	s.	d.
Super long grass Veld	0	8	0	11
Do. Karoo	0	7	0	9½
Medium	0	5½	0	6½
Short and Inferior	0	4	0	5
Wool for washing	0	4½	0	7

	s.	d.	s.	d.
Snow-white, Super to Extra	1	7	1	10½
Do. Ordinary	1	1	1	6
Fleece, washed...	0	0	0	11

Mohair.—Business has been rather quiet in Summer Firsts, sellers not feeling disposed to accept the offers made. In Mixed firsts and Winter a fair amount of business has been done, prices ranging from 10¾d. to 11½d. for Mixed Firsts and from 10½d. to 11d. for Winter Hair. Winter Kids may be quoted from 13½d. to 15d., according to quality.

	s.	d.	s.	d.
Firsts, Summer	1	1½	1	2
Kids	1	3	1	6
Seconds	0	6½	0	10½

	s.	d.	s.	d.
Winter	0	10½	0	11
Do. Kids	1	1½	1	3

Hides and Skins.—At the last London Skin Sales, Goat Skins suffered a decline from ½d. to 1d. per lb. All other classes remain unchanged. There is a good enquiry for all descriptions.

Buchu.—There is demand for Short Round Leaves only. Prices remain unchanged.

PORT ELIZABETH.

Messrs. John Daverin & Co., report under date October 25th, 1907:—

Ostrich Feathers.—Owing to Monday being a public holiday, there was no public sale held here this week. A limited business has been done out of hand at full current prices.

	£ s. d.	£ s. d.
Primes: Extra super	Special Prices.	
Good to super	15 0 0	20 0 0
Whites: Firsts ...	11 0 0	15 0 0
Seconds	7 0 0	10 0 0
Thirds	2 10 0	6 0 0
Feminas:		
Super	11 0 0	16 0 0
Firsts	8 0 0	10 0 0
Seconds	4 10 0	6 10 0
Thirds	2 0 0	3 0 0
Greys	5 0 0	9 0 0
Fancy .. .	6 0 0	10 0 0
Tails: White	1 10 0	3 10 0
Light	1 5 0	3 0 0
Coloured & Dark	0 5 0	1 2 6

	£ s. d.	£ s. d.
Blacks: Long ...	3 10 0	6 10 0
Medium	1 5 0	3 0 0
Short	0 10 0	1 0 0
Wirey	0 1 0	0 1 0
Floss	0 6 0	1 10 0
Drabs: Long ...	1 10 0	4 0 0
Medium . ..	0 12 6	1 0 0
Short	0 2 6	0 6 0
Wirey	0 0 6	0 1 0
Floss	0 6 0	1 10 0
Spadonas: Light	1 5 0	3 0 0
Dark	0 10 0	2 0 0
Chicks	0 0 3	0 2 6

Wool.—This market continues firm, and a fair amount of business has been done in the open market during the week, all well-conditioned parcels bringing extreme prices, but heavy and wasty lots continue difficult to sell except at low prices, especially anything of the Vermont strain.

Snowwhite, Extra Superior ...	21d	to	22d
Do. Superior	20d	„	20d
Do. Good to Superior...	19d	„	19½d
Do. Inferior Faulty ...	17d	„	18½d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	10d	„	10½d
Do. do. do. ...	8½d	„	9½d
Do. do. Karoo grown (special clips)	8½d	„	9½d
Do. do. do. ...	7½d	„	8d
Do. do. Mixed Veldt...	7½d	„	8d
Do. Light, faultless, medium Grassveldt grown ...	7d	„	8d
Do. do. Karoo grown	6½d	„	7d
Do. do. short, do.	6d	„	6¼d
Grease, Coarse and Coloured ...	4d	to	4½d
Scoured do. do. ...	6½d	„	12d
Basuto Grease, short	7¾d	„	7¾d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	8d	„	9½d
Do. do. do. ...	7d	„	8d
Do. do. medium grown, light, with little fault	6½d	„	7d
Do. do. short, faulty & wasty	5½d	„	6d
Do. do. Karoo grown, long & well-conditioned ...	6¾d	„	7¼d
Do. do. medium grown, light with little fault ...	5½d	„	6¼d
Do. do. short, faulty and wasty...	5d	„	5¼d

Mohair.—There has been no business done in Summer Firsts, and only a comparatively small quantity of Winter and Winter Kids have changed hands during the week, our sales of 70 bales being the only ones of any importance.

Super Kids, nominal	17½d	to	18d
Ordinary Kids and Stained ...	16d	„	17d
Superior Firsts, special clips (nominal)	14d	„	14d
Ordinary Firsts...	13d	„	13½d
Short Firsts and Stained ...	12½d	„	12½d
Superfine Long Blue O.R.C. Hair	13½d	„	13¾d
Mixed O.R.C. Hair (average)	11d	to	11½d
Do. very mixed ...	10d	„	10¼d
Seconds and Grey	9d	„	10½d
Thirds	5½d	„	5¾d
Winter Kids, special clips ...	14d	„	15d
Do. good ordinary ...	12½d	„	13½d
Winter Hair	10¼d	„	11d
Basuto Hair	11½d	„	12d

THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

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NOTES.

Cape Gooseberries.

Some few weeks back the Trades Commissioner in London received a trial consignament of Cape gooseberries from one of the leading fruit-growers and jam-makers in the Colony, which were packed in water in order to obviate the necessity of paying the sugar tax, and from Mr. Chiappini's report it seems that he is very sanguine about the prospects of developing a big trade in England for Cape gooseberry jam, providing that the fruit can be shipped at sufficiently cheap rates. The Middlesex Jam Factory have stated that Cape gooseberries sent over in this manner should be worth at present about £22 per ton, which is the same price that is being paid for raspberry and black currant pulps. Some of the Australian Colonies, it appears, have developed a large trade in the export of these two latter pulps, and there would seem now to be a good opening for the pulp of the Cape gooseberry. The Middlesex Jam Factory state that they will also be glad to receive, through the Trades Commissioner, sample tins of green figs and guavas and any other kind of fruit which might be profitably shipped in this form, in order that experiments in marketing may be undertaken in London. The Trades Commissioner is also inquiring whether it is possible to ship Cape gooseberries in the ordinary state (without removing the fruit from the pods), packed in bags as tight as possible without breaking the fruit, for which the freight is 25s. per ton, and growers who are willing to undertake experiments along these lines are requested to communicate with Mr. P. J. Hannon, Superintendent of Co-operation.

Berry Wax.

The following report has been made on a sample of berry wax by the Analytical Laboratory to the Chiswick Soap Company:—

"Specific gravity	0·9947	15 degs. C.
"Solidifying point	40·2	C.
"Melting point	41·5	C.
"Acid value	3·5	C.
"Saponification value	202·3	C.
"Iodine value...	2·3	C.

"The 'wax' contained (*i.e.*, yielded on saponification) glycerol 9·77 per cent., and was therefore not a true wax, but a fat. It consisted chiefly of Palmitin. Owing to its low melting point, it would be useless for purposes where a high melting point wax is necessary, such as boot polishes, etc. It was not susceptible of a high plish when rubbed with a soft cloth, but gave a greasy-looking surface. Probably of little value for candles, but might be of use for hard soap making." In this connection the Trades Commissioner remarks that different opinions have been expressed in regard to the commercial value of the same product, and that, while this report is not particularly favourable, other firms have made more encouraging reports in the same direction.

International Horse Show, London.

The Directors of the International Horse Show, London, have definitely decided to hold the 1908 Show at Olympia, June 18th to 27th inclusive, commencing on the Thursday of Ascot week and continuing during the whole of the following week. All arrangements to this end are now complete, and the dates selected are being reserved throughout the country for this unique Show, on the perfect organisation of which a sum of £30,000 will be spent. The Show will run for nine days, a performance being given in the Garden Arena each afternoon and evening. A deputation is leaving for New York to confer with prominent American and Canadian exhibitors during the New York Horse Show, who are already collecting the pick of the equine world on the American Continent to represent them. The prize list, containing 150 classes, is almost complete. The total prizes amount to £10,000, this being the largest sum ever offered at any Horse Show in the world. The French, Spanish, Dutch, and Belgian breeders each propose to offer a Challenge Cup as a mark of their interest in the international aspect of the Show.

South African Wools in London.

Messrs. Brexton, Ronald & Co., in their annual wool report, offer the following interesting remarks on South African wools, which are being circulated by Messrs. Stephen, Fraser & Co., of Port Elizabeth:—Character and Selection: The quantities offered have been slightly smaller than those of the preceding twelve months, viz., 30,856 against 34,919, but in point of selection it is pleasing to be able to report some improvement. Many excellent lines of the article from the Cape Colony were shown, and looking to the prices realised, it is evident that buyers appreciate the attention to breed and skirting. The Western Province sent some well-bred wools, and Mossel Bays, although a little open and partly weak, were in good yielding condition. Algoa Bays were no lighter than usual, or than they ought have been. Some really badly got up lots came from this part. In Natals the choice of good lots would appear to be getting more restricted year by year, but at the same time it would scarcely be fair to credit this Colony with all the poor, wasty, ill-conditioned parcels to which is applied the term "Natal." Many of them have obviously had the merest passing acquaintance with the Colony.

The Orange River Colony showed some particularly nice parcels, the top price being as high as 11½d. These wools, although varying in condition according to the different districts, all showed signs, in a weak staple, of a trying and droughty season. This Colony has evidently taken up the question of classifying and skirting very earnestly. "Packed and sorted under supervision of the Government Inspector" has become a well-known phrase, and the operations, being carried out in the most approved fashion, cannot fail to bring their own reward to growers.

In an open free market it surely stands to reason that well prepared lots must meet with the most support, and ultimately return to the grower such prices as will more than make up for any expense to which he has been put. Reasonable care must always be employed on the get-up of an article, no matter what it is, to get the best results, and when, as is so often the case, short and long wools, weak and strong, skirts and bellies,

are all to be found baled up together, it is as a rule safe to assume that more care might with reason have been taken. Growers should always remember that the manufacturer is able to pay the longest prices, and he is therefore the one whose wants should receive most consideration, and it is self-evident that if the man who only wants long wools has to buy short staples with it, his price is at once very much reduced. Further, in any efforts which are made to get up wools suitably for this market, it would be well to bear in mind the advisability of branding the bales with the owner's name, or perhaps preferably with that of his property. This is retained in a buyer's mind from year to year, more readily than mere initials ever can be.

A fair quantity of East Griqualand Wools came on to the market early in the year, and showed the usual characteristics of the district, being very soft handling. They were marketed in good style, and being properly classed, met with considerably more attention than they otherwise would have done, seeing that owing to an unfavourable season the condition was none too good and the staple lacking length. 11½d. was the top figure reached. With regard to the actual breeding of the sheep, this is a matter which the grower himself must know most about, but an important point to be remembered is that a big weight of clean wool is the object to aim for. A heavy fleece with a large percentage of grease and dirt is fully reckoned up by the buyer, and less paid for it accordingly. The effects of the recent importations of Australian Stud Sheep will be eagerly looked for, as excellent as much of the wool shown at the South African Products Exhibition was, there was also a goodly proportion of it which would have been the better for a more robust strain. Scoureds, the selection of which was fully up to the average, sold satisfactorily throughout, but short burry kinds reflected in July the weakness which was the noticeable thing in all carding wools.

Imported Noted Thoroughbred.

Mr. P. W. Michau, of Fortuin Plaats, has recently imported the thoroughbred stallion "Gun Club." Mr. Michau's first attempt was most disappointing; he had previously imported "White Feather," by "Retreat," out of "White Lily," by "Doncaster" (sire of "Bend Or"), by "Black Lily," sire of "Long Bow." "White Feather" was the winner of Ascot Plate and Goodwood Stakes, and possessed magnificent action. He was landed at Port Elizabeth in good condition, and was universally admired. Very mysteriously, however, "White Feather" was subsequently found with a fractured leg, and had to be shot. This was a great loss to its owner, as, although he was insured for the voyage, this liability was raised immediately the horse was landed sound. Mr. Michau, however, cabled to the same source for another thoroughbred, and this time secured "Gun Club," a liver-chestnut, standing 15·2½. He is by "Deuce of Clubs," out of "Miss Gunning," by "Petronel," out of "Rose Maybe," by "Breadalbane," out of "Frondeur," by "Annandale." He was the winner of the Salisbury and Catcoham (Epsom) Stakes as a two-year-old and also the the Golborne Park Plate; as a three-year-old the Alexandra Park Handicap; as a four-year-old the Manchester Beaufort Handicap; and as a five-year-old the Bradford and Faceby Handicaps. "Gun Club" was landed safely at Baroda, and is rapidly getting into condition after his ocean trip.

The Export of Cape Oats.

The Trades Commissioner in London acknowledges the receipt of five samples of Cape oats, which were submitted to three leading firms in London. Messrs. Campbell and Wilson—members of the Corn Exchange—state that the samples were better than Russian oats, and that if shipments had been in London Docks at the time they could have been sold at 19s. per quarter up to 5,000 tons. This firm will be able to sell oats on sample, providing that the sample is a fair one and representative of the bulk. This point is emphasised by Mr. Chiappini, who adds that he considers a better course would be to send consignments.

The report of Messrs. Campbell and Phillips is as under:—"With reference to the samples of Caledon oats which you handed me yesterday, the following are the valuations for these cost, insurance freight London, arrived, according to sample, London Corn Trade Association Terms (London Terms), per 304 lbs. shipped in bags: Sample No. 1, 18s. 6d.; No. 2, 18s. 3d.; No. 3, 18s. 9d.; No. 4, 18s. 5d.; No. 5, 18s. 9d. Had we been placed in the position of knowing the date of shipment and given the quantity we could have placed any of the above samples with buyers last night. Stocks are low at present, and for good sound feed there is a distinctly good demand. We trust that your Government will send us offers by Monday, and these with the full details of date of shipment, quantity, etc., we shall have offers in hand from you for immediate sale to arrive. Nevertheless, we strongly urge your Government to effect the immediate despatch of consignments, the parcels to be of such size as is convenient for despatching immediately, for once buyers see for themselves the quality in bulk on arrival, with the present view of the market we are confident of obtaining numerous orders, provided that the standard of the quality is maintained, therefore in shipping consignments and in forwarding large shipment samples it is very important that fair average shipments be consigned to place the trade on a sound business and continuous footing."

Royal Horticultural Society's Colonial Fruit Show, 1908.

The Trades Commissioner (Mr. C. du P. Chiappini) writes.—The Royal Horticultural Society have fixed March the 5th and 6th as special days for the holding of a Colonial Fruit Show in London, especially including Cape fruit. They invite South African fruit-growers to exhibit. I beg to enclose herewith a small parcel of pamphlets containing full particulars of these exhibitions, and will ask you to consider the advisability of inviting South African fruit-growers to enter exhibits at this Exhibition. I would recommend that for this exhibition the fruit-growers be invited to send what exhibits they please to compete for the prizes as arranged in the Society's pamphlet through their agents in London, that they, the agents, sell these exhibits on this side, and account in the ordinary way, and that such persons who have not duly-accredited agents, and particularly those shippers who are taking advantage of the Government Experimental Fruit Shipment Scheme, be permitted to send their exhibits to me. They could, if they liked, specially mark such boxes as they wish to be exhibited, but they must be warned that I will not hold myself responsible for the exhibits, forther than to do my best to protect them, to exhibit them, and then to realise the best possible price when they have been up for a few days. They cannot expect to realise much for the fruit after exhibition, which will probably be worth little or nothing.

It will be noticed, under Division 2, prizes are offered for Colonial Preserves, Dried Fruits, and Jams. All South African jam manufacturers should be invited to compete for these prizes, as there is no doubt that the publicity offered by these exhibitions is of great value to the jam manufacturers. The Society will also be pleased to accept any other articles in the fruit and vegetable lines for exhibition, such as Berry Wax, Aloes, Aloe Fibres, Cape Bush Tea, Succulent Plants, and any such articles relating to botany or horticulture which might be of interest, but I would not recommend that those connected with the wine or tobacco trades should be invited to show on this occasion in the exhibition, as these products give a lot of trouble, have to pay duty, etc. With reference to expenses connected with this Exhibition, I do not think there will be any at all. Exhibitors forwarding goods through their agents must do so at their own risk and expense. Those forwarding exhibits through me will, I hope, not be considerable, but their expenses will probably be covered by the proceeds of the sale of such fruit. I am told that the other South African Colonies will also be invited to participate in this Exhibition, and I will, at a later date, interview their representatives and communicate further on this subject.

Steenbok Zuuring or Sorrel.

An Albany correspondent writes:—"In the 'Edinburgh' report in the *Agricultural Journal* of November, under the heading 'Wheat,' occurs this sentence: 'The old land was full of steenbok zuuring (*Rumex acetosella*),' and I should like to know if this is the same weed with which my and neighbouring farms are infested, and what measures are recommended for its eradication? The plant with us is indestructible—the more it is cultivated the more it grows. Its habit is to rapidly spread underground, sending up shoots at intervals all along the roots. When in bloom it is a blazing scarlet (so scarlet that I think the philosopher who enunciated the hypothesis that the planet Mars owes her ruddy hue to the colour of her vegetation must have stumbled across a field of this pestiferous vegetable octopus). All ordinary crops are squeezed out; the plant will shift anything as far as I can discover, including the owner. I have tried working a small isolated patch over and over again with a fork, carefully picking out all visible roots and leaves, and then firing a heap of rubbish three feet high all over the patch, thinking that must kill all vegetation. Not a bit of it, Mr. Steenbok Zuuring springs up again, Phœnix-like, refreshed and resplendent. Any tiny scrap will found a colony."

Several other correspondents have addressed us on the same subject, and as it is one which has been frequently discussed in the pages of the *Agricultural Journal*, and will probably be as often mentioned in the future, it is as well to bring what information is available on the subject to the front once more. This very troublesome weed is a species of dock, of which the largest kinds are the commonest weeds of moist, waste places and ditch banks. They are all perennial and produce immense quantities of seed. This one seems proof against drought so long as its wiry roots keep an end under ground, and its capability of starting new plants by bud-propagation from any bit of root enables it to withstand the cutting up it gets from the usual routine of ploughing and harrowing. These are the terms used by Professor MacOwan as far back as 1892 in describing this weed, which had then become a pestiferous nuisance to the grain farmers of the Western Province. Since then it has spread to other parts of the Colony, more particularly where the soils are light and inclined to be acid, for it seems to thrive best in such conditions.

Several remedies in the shape of preventive measures have been suggested from time to time, and among these the most successful seem to be those which have as their foundation the application of thorough and careful cultivation of the soil. It is undoubtedly a difficult thing to get rid of this sorrel, or Steenbok Zuuring, more particularly in those localities in which it has established itself for some time, for as fast as the ground is cleaned it seems to become foul again, probably by being seeded from neighbouring lands. One remedy which has been found fairly successful is the application of lime, but this is not always practicable, owing to the cost of the undertaking. But there seems little doubt that where this could be carried out effectually and the land well worked, the zuuring would soon be considerably reduced, and probably in time eradicated. But it would call for continuous effort extending over a fairly long period to secure entirely satisfactory results.

The other method then is that of cultivation. For this it was suggested by Professor MacOwan and supported by Professor Blersch, at one time principal of the Agricultural School at Stellenbosch, that considerable advantage should be gained by sowing infested lands with lupins or sand vetches and ploughing them in for green manure. The ploughing in of such a crop would considerably enrich the soil, it was argued, and thus largely interfere with the growth of the zuuring, though it would not remove it altogether. The underlying principle of this suggestion is very sound, for it is well-known that by enriching the soil in this way the Steenbok Zuuring would be largely discomfited, for it is one of those plants which seem to thrive best on poor, acid soils. Professor Blersch also suggested the use of the mower on level lands, but this does not seem to offer a very effectual remedy for such a weed, although it might possibly help to keep it in check.

Mr. J. van der Merwe, of Paarl, published in the *Agricultural Journal* for July, 1893, the following as an effective method of tackling this pest in the Western Province:—"Steenbok Zuuring gives preference to sandy soil. Well, sandy soil ploughed after the last rain will remain fit for cultivation throughout the year. Say one ploughs it in September As soon as the zuuring reappears the soil must be ploughed crosswise. The farmer must take care, if he notices the weed sprout again, to plough the soil over a third time, or he can continue the cultivation until the zuuring does not shoot again. Manure the soil well in April and sow it. I would prefer sowing barley. I am convinced that for the next five or six years the zuuring will not be noticed again. But the corn farmers may say, 'How can all the ploughing and cultivating be done during the harvesting season?' Well, this is an additional work. Nobody can wage war without going to expense; and war should be declared against Steenbok Zuuring. When the grass is wet with dew and fine salt is sprinkled on it, it dies; but whether the root dies too I have not experienced." Whether this method could be applied in the Eastern Province or not with advantage we must leave to the judgment of the afflicted ones there, but it is the only method which holds out much hope of effective relief.

Agricultural Show Dates, 1908.

The following dates have been fixed for Agricultural Shows during the season 1908:—

Paarl, Thursday, January 23.
Stellenbosch, Thursday, January 30.

Robertson, Wednesday, February 12.
Malmesbury, Wednesday, February 19.
Aliwal North, Wednesday and Thursday, February 19 and 20.
Caledon, Thursday, February 20.
Bayville, Friday, February 21.
Richmond, Wednesday, February 26.
Western Province (Rosebank), Tuesday, Wednesday, and Thursday, February 25, 26, and 27.
Bathurst, Wednesday and Thursday, February 26 and 27.
Humansdorp, Wednesday and Thursday, February 26 and 27.
Graaff-Reinet, Tuesday and Wednesday, March 3 and 4.
Queenstown, Tuesday and Wednesday, March 3 and 4.
King William's Town, Friday and Saturday, March 6 and 7.
Middelburg, Wednesday, March 11.
East London, Wednesday and Thursday, March 11 and 12.
Cradock, Tuesday and Wednesday, March 17 and 18.
Grahamstown, Thursday and Friday, March 19 and 20.
Bloemfontein, Wednesday, Thursday and Friday, March 18, 19, and 20.
Port Elizabeth, Wednesday, Thursday, and Friday, March 25, 26 and 27.

Seed Distribution.

Farmers desirous of seeds from the Agricultural Department for experimental purposes are requested to note that these are supplied to farmers direct on application, provided they are not members of Farmers' or Fruit-Growers' Associations. Members of the latter are requested to apply through the secretaries of their Associations

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Books for Farmers.

Mr. T. Maskew Miller informs us that he has now received a limited supply of Coburn's book on Alfalfa. This is the larger and latest work on Lucerne issued by Mr. Coburn, the well-known authority on the subject. While on this subject, we owe it to Mr. T. M. Miller to state that by an unaccountable error in his advertisement recently the price of Prof. Wallace's "Farm Live Stock" was stated at 9s. 9d., instead of 22s. Will our readers please note?

A new form of roofing, easy to handle, cheap and effective, is advertised by Mr. Chas. Wm. Thomson in the current issue. The material is known as Calmon's Asbestoslate, and seems well worth looking into by farmers and others who need handy materials for buildings.

FARM AND VELD.

The Roberts Water Shutter.

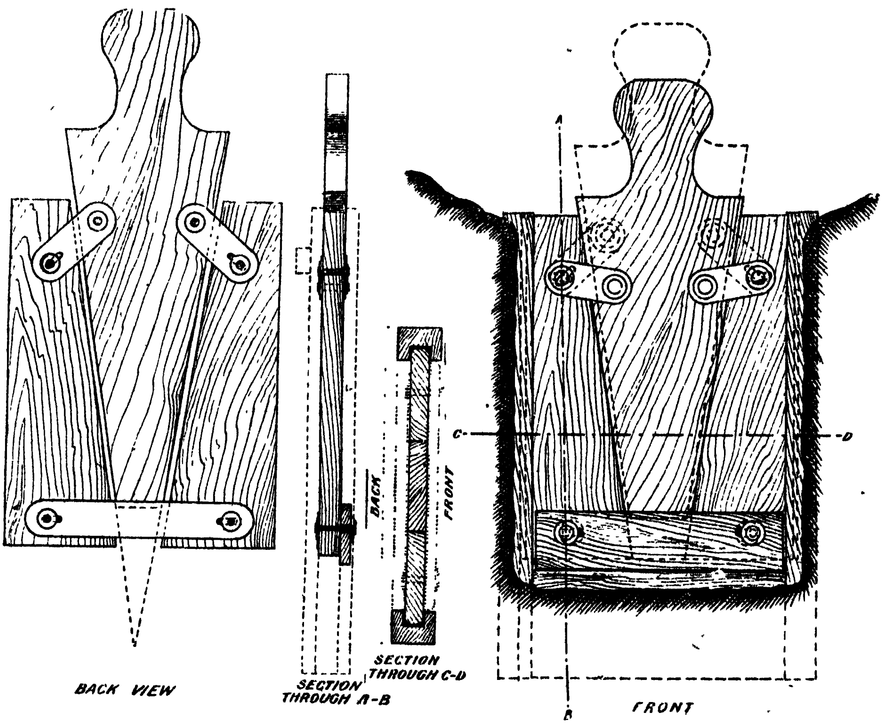
When leading water for the irrigation of land through a system of distributing furrows and laterals it is necessary to turn the whole volume of water flowing in a leading furrow successively into a series of branch furrows or direct into a succession of beds. Speaking generally, the smaller the area of these beds or "akkers," the greater will be the economy in the use of water, provided each bed can be fed in turn from a well-aligned and well-made distributing furrow. A complaint is often made by irrigating farmers that this elaborate system of distribution involves the construction of a great number of "turn-outs," which, if made in wood and masonry, are costly to construct and maintain, and if the "turn-out" is made by cutting the furrow bank and placing the spoil in the furrow just below the cut to form a dam, and thus force the water through the gap, then the furrow in time becomes very ragged and leaky.

An ingenious shutter has been invented by Mr. Roberts, of Tarka Bridge, near Mortimer, which is satisfactory in its action, and goes a long way to meet the objections referred to above. The feature of the shutter is that it is capable of a certain amount of lateral expansion and contraction, and can thus adapt itself to small variations in the widths of small distributing furrows.

The shutter is made to work in a light wooden frame with grooves, permanently fixed in the furrow at suitable places, and can be used without the frame and grooves. The principle of the shutter is clearly shown in the drawing of the front elevation, herewith. It consist of three separate parts. The side members are trapezoidal in form, and the central member, which is extended upwards to form a handle, has the form of a truncated wedge. The central wedge-shaped member is connected to the lateral, trapezoidal, members by means of two links working freely on pins attached to the separate parts, as shown. In order to ensure that the sides of the shutter shall remain truly vertical while the links are being rotated the latter are slotted for a short length at the ends engaging with the pins attached to the side members.

The lower end of the central, wedge-shaped member is free; the lateral pins are, however, joined to one another by means of a wooden or metal cross piece of such height that the bottom edge of the central wedge-shaped member, when drawn up to the fullest extent possible, is at least one-quarter of an inch below the top of this cross piece. The cross piece or tie has a slotway at each end engaging with a pin attached to each of the lateral members near the bottom. It will be thus readily understood that according to the length of the slotways and of the links a corresponding variation in width can be given to the shutter by raising or lowering the central wedge-shaped member.

When it is desired to work the shutter without grooves or a frame, Mr. Roberts recommends the extension of a wedge downwards to a point, as indicated in dotted lines in the back view of the shutter. If the shutter is to be used in an earth gap, without grooves and frame of any kind, it would be advisable to give the whole shutter a trapezoidal section, *i.e.*, make it about double as wide at the top as at the bottom, as no distri-



buting furrow can be maintained with vertical sides. It would be further advisable to slightly sharpen the sides and bottom of the lateral members. If the shutter is to stand constant and rough usage, and is to have a reasonably long life, it should be made of good hard and seasoned wood which will stand the trying frequent changes from the wet to dry states, and the links, pins, tie, etc., should be made of brass.

Gas Lime for Manure.

The question as to the advisability of using Gas Lime for manurial purposes has cropped up repeatedly of late. The following from *The Fruit-Grower*, October 31, will show that the product contains certain poisonous compounds:—"Gas Lime.—This form of lime is a by-product in the manufacture of coal gas, for which lime is employed as a purifying agent. It consists of slaked lime more or less saturated with compounds of sulphur; it is liable to certain considerable variations in composition, and often it has but little basic property left in it, and so cannot take the place of lime or chalk. It contains small proportions of certain compounds of sulphur, which are virulent plant poisons, this fact necessitating great care in its use. It is unprofitable to use it at considerable distances from a town or where high railway rates prevail, as the percentage of lime present is usually small."

Chlorosis or Leaf-Yellowing in Peach and other Trees.

Since several complaints on the yellowing and dying back of fruit trees in certain districts of our Colony have again been made, and the investigations held have proved the cause to be due to over-irrigation and the absence of any effective means of sub-drainage, it would be as well to state briefly the cause and effect of the trouble reported for the benefit of those who may suffer from these maladies. The trees invariably give proof of arrested growth; the shoots of the year are small and weakly; but the fascicular growth of branchlets characteristic of true yellows is absent. In many instances the upper twigs of the current and previous year die back completely. The bark, generally speaking, becomes much roughened and cracks, another sign of arrested growth. The yellowing of the leaves of the trees may be said to be general, although here and there a branch bears normal foliage. The whole aspect is such as an experienced gardener would pronounce to be "mischief at the roots." Turning to the soil, it will be found, where the so-called yellows exists, it consists of a more or less dense clay, precisely the kind of material which, in the absence of trenching to a greater or less depth, is certain to form itself into a coherent mass, destitute of the necessary aeration, and excessively retentive of water. In some instances, on digging some eighteen inches into the ground, moisture would creep up into the hole from below.

Here are two distinct mischiefs indicated. First: even supposing that the erf had been trenched three feet deep at the original planting of the trees, and thus an abundant aeration secured, rendering it sufficiently porous for vegetation, that favourable condition had been, in the course of years, entirely lost. The unreasonable quantity of irrigation water thrown in and compelled to percolate slowly downwards evidently had the effect of driving out the interstitial air, and supplying its place with fine mud brought down from the upper stratum. In such an unaerated earth mass it is impossible for roots to maintain a healthy, vigorous existence. Their ultimate filaments, through which alone absorption takes place, cease their functions and die, and by their death the tree loses so much of its supply of food material. These same conditions prevail two or three feet below the surface in what may be taken as the proper feeding ground of the main root system, with an additional advantage, viz., the almost constant presence of a superabundance of water, partly belonging to the water-table of the subsoil, and partly the seepage from irrigation. It is scarcely possible to conceive of conditions more unfavourable for the health of the tree-roots thus deprived of the air necessary to their continual respiration, and waterlogged every time their turn for irrigation comes round. The white absorbent portions of the rootlets perish utterly and rot away. As soon as this commences, the supply of water carried up to the foliage and growing twigs decreases as the mischief increases—the leaves first and then the twigs can no longer perform their functions: the green chlorophyll-contents of the cells die and are bleached to a sickly yellow, and the tree ultimately perishes.—E. P.

Caustic Soda in Dips.

Last month we published the recommendation of the O.R.C. Department of Agriculture with reference to the use of caustic soda and sulphur as a sheep dip. It is therefore only right to publish the following warning addressed by Mr. H. Geldard, of Bothaville, O.R.C., to the Bloemfontein *Friend*. Mr. Geldard writes:—I notice that the Agricultural Department, through their inspectors, are impressing upon the farmers of the

O.R.C. the virtues of caustic soda and sulphur as a sheep dip. Statements are also being made to the effect that the dip does not injure the wool for "dyeing purposes," and that home tests have also been made, proving that caustic soda in dip does not interfere with the dyeing qualities of this wool. That I can quite believe, but as one familiar with home processes of wool-buying and its manufacture from raw material to the finished article, I would point out that the Agricultural Department are not quite correct if they consider caustic soda dip does not harm the wool. Caustic soda used in sheep dip causes "corrosion of the fibre," and wool corroded by caustic soda would still dye like sound fibre. It is in the spinning process that the fault would be manifest, and also in the finished article. Experienced buyers would be quick to notice this, and put a reduced value on the wool. Sulphur dips can be made that will cure scab and are not harmful, but caustic soda will do more harm than good, and the experience of some farmers in this district corroborates this.

Salt Spotted Butter.

"Persevere" writes: "In enclose cutting on salt spotted butter which, in company with my actual experience, may be of some slight service to those who—like myself—make butter under dry atmospheric conditions. The first time I saw these spots I thought I had either put too much salt in the butter or not 'worked' it sufficiently. I tried less salt and more 'working,' without the desired result. Next I allowed the butter to lie for two days—after salting—then 'worked' it, but got no further forward. I then turned my attention to the salt. I might here state I use Higgins' (English) finest dairy (table) salt. I thought it possible that this might be too hard in the grain and not easily dissolved. This, however, like my other experiments, was barren of results. So I felt 'tied in a knot.' Coming across the enclosed article seemed to be the solution of the difficulty, and having carefully experimented on the basis of that article, I found it absolutely true in practice. I give my experience for what it is worth."

The article in question says:—The white crystals that sometimes appear on the surface of print butter have often been noticed. They are entirely unlike mottles or the white curd spots that may occasionally be noticed on the freshly-cut surface of butter. The crystalline form and salt taste of this deposit show it to be pure salt, which was well mixed through the mass of the butter when it was made, but which has come to the surface of the butter in crystalline patches. These crystals sometimes accumulate in such quantities as to form a white incrustation nearly covering the entire exposed surface of the butter. These white spots are seen most frequently in winter, and especially on 1 lb. prints or blocks of butter which have stood in a refrigerator. They often appear within twelve hours after the butter is made, and increase in size as long as the butter remains under conditions favouring their formation. Such spots are not an indication of defective salt, of poor workmanship, or of bad butter; they simply show that the butter has been kept in a cold place, which at the same time was so dry that the water of the brine evaporated, leaving the salt on the surface.

A demonstration of this fact (continues *Farmer and Stockbreeder*) was made by taking two separate pounds from a churning of freshly-made butter and placing them in two glass jars. About an inch of water was poured into one jar and the same quantity of sulphuric acid into the

other, the butter being raised above the liquids in each case. The butter was thus exposed to a dry air in one jar, and to a moist atmosphere in the other. The jars were tightly covered and left in a refrigerator in which the temperature was about 50 degrees Fahr. Within a few hours crystals of salt began to form on the butter in the jar of dry air. In a few days these crystals increased in size until nearly the entire surface was covered with salt rosettes. On the other butter, which during the same time had been exposed to a moist air at the same temperature, there were no crystals. The surface of the butter, however, was completely covered with drops of brine. In a second trial, when the conditions were the same, except that the two jars of butter were placed in a room where the temperature was 70 degrees Fahr. instead of 50 degrees Fahr., the same results were obtained. The results of these experiments show that the incrustation of salt upon the surface of the butter can be prevented by keeping the butter in a moist atmosphere. Such conditions are insured either by sprinkling the floor with water, or by having a sufficient number of open vessels of water in the refrigerator or the place where the butter is kept.

Forcing Fruit Production.

"Old Man of the Sea" writes:—"Can your fruit-tree expert tell us how to make vigorous trees bear? Some years the trees bear fairly well; they grow vigorously all the time. Root pruning and twisting the branches until they crack have been ineffectually resorted to. There is a local expert who claims to be able to make any tree bear abundantly, given that there is a reasonable growth. I don't know what his method is. He is not a philanthropist, and works for a wage, and however worthy the labourer may be of his hire, one has not always got the capital in the house to pay the hire."

The remedy is to summer-prune the trees, as well as winter-pruning them, just about the latter end of February; the rule being, as soon as the fruit has ripened and been taken from the tree. If this operation is taken in hand earlier in the season the result will be the encouragement of more wood, but if done at the proper time, just before the tree stops growing and the flow of sap is less vigorous, it will force out the dormant buds, which will develop into fruit-buds or spurs. Summer-pruning means the cutting back of the wood growth of the year to within six inches from where it started. When root-pruning, be careful to cut the main roots of the tree only from the two sides against which the prevalent winds do not blow; these roots may be cut off three feet from the stem to a depth of four feet.—E. P.

The Cabbage Moth.

The same correspondent writes:—"What do you recommend for the tiny cabbage moth? I tried spraying, but cannot get a spray to adhere uniformly on a cabbage leaf. The finest spray runs into globules, much as if the leaf were greased. The pest is very bad this year all over this district."

The ravages of the cabbage moth can be stayed by dusting the young plants with tobacco powder or spraying them a couple of times with tobacco water, the stronger the better.—E. P.

Potato Planting.

Mr. Harold T. Sills, of Dordrecht, writes:—Many farmers who grow potatoes have, no doubt, experienced the difficulty in getting natives to plant properly, as they always plant the potatoes too close together. I have (as far as I am concerned) solved the difficulty. I use a Flying Dutchman plough with a "riding attachment," and one white man riding on the attachment can plant potatoes (in the furrow made by the front share, the mould turned over by the rear share completely covering them) with the greatest ease, even if the oxen go quickly. I use a "box for distributing fertilizer," which I got from Malcomess and Co., Ltd., for carrying the potatoes in while sowing. I find it very convenient, as the strap which goes over the shoulders holds it firm and leaves both hands free for planting. I hope the tip may be useful to other potato growers.

The Comparative Cost of Jackal Proof Fences.

Mr. Llewellyn Roberts, of Kroomie Siding, writes:—Some time ago you published a communication from Mr. Jno. Arnold, giving the comparative cost of various jackal proof fences. The subject is of vital interest to the farmers at present, in view of the fact that fencing the jackal out is now recognised as the best, if not the only satisfactory method of dealing with him. I make no apology therefore for bringing up the subject again. It is generally recognised that a barb wire fence, provided it has a sufficient number of strands and closely laced together, is far and away the most durable and effective fence to keep out Master Fox. But a question which does not appear to have been cleared up is, what is the minimum number of strands that may with safety be used, and what is the cost of a barb wire fence as compared to ordinary wire netting? A letter herewith from Mr. Chas. Hughes, of Knapdaar, addressed to Mr. Hobson, and which I have permission to publish, throws some light upon the matter, as coming from a well-known farmer, who has four years' actual experience of barbed wire as a jackal proof fence. You will notice Mr. Hughes's fence is of only eleven strands, and laced 3 feet apart. Personally I should have used another strand or two, and also closer lacing, but "the proof of the pudding is in the eating" is a true saying, and Mr. Hughes has tested this fence for four years. Herewith is Mr. Hughes's letter, and also a comparison of cost of several fences. The prices of material are taken from actual quotations of Port Elizabeth firms about September of the current year. Poles and labour have not been taken into account, for they would be about the same for each fence.

Mr. Hughes's letter, addressed to Mr. Hobson, reads as follows:—"With reference to our conversation about jackal proof fencing and the number of barbed wires required to make it effective, I have had some fencing up now for four years, and have found it absolutely jackal-proof. It is of eleven wires, placed as follows: The first wire is 4 inches from the ground to allow for packing with stone to prevent burrowing. (He then illustrates the distances apart of the other rows, showing the next five to be also set 4 inches apart, the next two 4½ inches apart, the next 5 inches, and the top one 6 inches above that.) The first six wires I have used wire with the barbs 3 inches apart, after that I have used the wire with barbs 6 inches apart. My laces have been put 3 feet apart. The first were put up by hand, but I have lately used one of Roberts's lacing machines, using No. 10 wire, and have found it most satisfactory. I have put up Kitselman fencing, and it is undoubtedly a good fence, but not, in my opinion, to be compared with an all barbed wire fence."

The following is the comparative statement of costs of barbed wire fence vs. netting, enclosed by Mr. Roberts:—

1 Mile of *Mr. Hughes's Fence* (11 strands barb wire, laced every 3 feet).

6 wires, 3″ barbs, 14 gauge, 1,476 lbs.
5 wires, 6″ barbs, 12½ gauge, 1,640 lbs.

	£	s.	d.
3,116 lbs. at 14s.	£21	14	0
Lacing wire, 6¼ rolls No. 10 plain wire at 12s. 6d....	3	18	0
	£25	12	0

1 Mile of *13-strand Barb Fence*, laced every eighteen inches with No. 12.

	£	s.	d.
3 wires, No. 12½, x 3″ barbs, 1,005 lbs. at 14s.	£7	0	0
10 wires, No. 14, x 3″ barbs, 2,820 lbs. at 14s....	19	14	0
Lacing wire, No. 12, galv., 900 lbs. at 14s.	6	6	0
	£33	0	0

1 Mile *Wire Netting*, 36 x 3″ x 13 gauge, supported on 7 wire fence.

	£	s.	d.
5 wires, No. 8, galv., 1,800 lbs. at 12s. 6d.	£11	5	0
2 wires, No. 12½, x 3″ barbs, 564 lbs. at 14s.	3	19	0
Laced every 6 feet, No. 8, galv., 550 lbs. at 12s. 6d.... ...	3	8	9
Wire netting, 36″ x 3″ x 13 gauge, 1,760 yards at 5¼d. ...	38	10	0
Tie wire, 40 lbs.	0	5	3
	£57	8	0

The above shows a difference of £31 16s. in favour of Hughes's fence and £24 8s. in favour of 13 barb fence, as compared with a wire netting fence.

Comparing the cost of adding barb wires to an old existing fence, instead of adding wire netting, for jackal proofing:—

I Mile, adding 6 wires to old 7-wire fence, and lacing every 18″.

	£	s.	d.
6 wires, No. 14, x 3″ barbs, 1,700 lbs. at 14s.	£11	18	0
Lacing wire, No. 12, galv., 900 lbs. at 14s.	6	6	0
	£18	4	0

1 Mile wire netting added to existing 7-wire fence.

	£	s.	d.
Wire netting, 36″ x 3″ x 13 gauge, 1,760 yards at 5¼d. ...	£38	10	0
Tie wire, 40 lbs.	0	5	3
	£38	15	3

Or a difference of £20 11s. 3d. in favour of adding barb wires. The barb wire fence being protected by its barbs is ever so much more durable, and more effective than the netted fence.

MILK RECORD.

[ELSENBURG COLLEGE HERD.]

Subjoined is the Milk Record to 30th November :—

Breed of Cow.	Days in Milk.	Yield in Lbs.		
		During November.	Total to date.	Daily Average.
FRIESLANDS.				
Romula	292	705	9046·5	30·9
Victoria	281	671	7550·5	26·9
Violet	164	691·5	5016	30·6
Bell	122	810	3727	30·5
Rose	96	1043	3918	40·8
JERSEYS.				
Gladys	177	746	5717·5	31·2
Gertie	167	747·5	5082·5	30·4
Fuschia...	103	612·5	2426·5	23·5
Grace	103	535·5	2111	20·5
Gwendolen	87	807·5	2550	29·3
Gilliflower	91	879	3037·5	33·4
AYRSHIRES.				
Cherry	223	224	3799·5	17
Queen Dot	172	410	3951	22·9
Lobelia	120	556·5	3071·5	25·5
CROSS.				
Disa	241	469·5	4884	20·2
Bessie	25	1213	1213	48·5

THE CASTRATION OF OSTRICHES.

I. Showing seat of operation and most comfortable position for operator. 2. A group of castrated birds. 3. A capon 12 months after operation. 4. Another capon same date showing feathers. 5. This bird was the most obstreporous brute on the farm a year ago. Since castration as quiet as a lamb. 6. A hen six months after castration. The drab feathers should be noted as they are now coming quite black like a cock.

THE CASTRATION OF OSTRICHES.

By S. Elley, M.R.C.V.S.

Age.—Cocks of any age over 18 months may be operated upon; it is advisable, however, to wait until after the second pluck, when the feathers have turned black and the masculine characteristics are developed. Perhaps the best and safest age is between two and three years. Hens should not be older than two years and six months. At about two years the ovary is easily located and removed without being so far developed as to cause any excessive hemorrhage.

Instruments.—The necessary instruments are few, and consist of two scalpels, or ordinary dissecting knives, a pair of bulldogs, or artery forceps, one small full-curved needle, one large curved needle, a needle-holder, and a chloroform inhaler. Disinfectant lotion, and a supply of cotton-wool should be at hand.

Preparatory Treatment.—The birds should be brought into the kraal, and starved for at least 18 hours before it is intended to operate; having the stomach and intestines quite empty is one of the most important factors in a successful operation.

Place the instruments in a tray or basin containing some disinfectant; a tablespoonful of Lysol added to an ordinary basin of water makes a suitable lotion, having two great recommendations: Firstly, that it remains transparent, so that the various instruments can be readily seen when required; and, secondly, it has no corroding effect upon the instruments.

Note.—Fresh water should be used with Lysol; if the water is brak, a cloudy deposit is thrown out.

The Operation.

Catch the first bird to be operated upon, put an ordinary plucking-cap on his head, and throw him in the following manner: Take a long riem, with a ring at one end, and put it round the bird's legs in the figure of 8 manner (as used for tying the hind legs of a cow), commencing with the left leg, complete the figure round the right leg, putting the loose end of the riem through the ring.

One boy now takes hold of the left wing to steady the fall, whilst another pulls on the loose end of the riem, straight out at right angles to the bird's right leg. The bird then falls gently on to his left side. The cap is now removed from the bird's head, and the inhaler put on.

Pour two drachms of chloroform on a small piece of cotton wool and place it in the inhaler; allow three minutes to elapse, and then repeat the dose. The bird will now commence to get drowsy, but the operation should not be commenced until he is thoroughly under the influence of the anæsthetic. A third dose can be given about three minutes after the second, and in the majority of cases the bird will be quite ready for operation very shortly after receiving it; a fourth dose, and, if necessary, a fifth, can be given at five or six minute intervals during the operation.

Strike the leg sharply or move the wings to ascertain if the bird is properly under; a safe test is to grasp the leg and attempt to pull the bird on to his back—if the slightest consciousness remains, this movement will be resisted. Having ascertained that anæsthesia is established, let the boy who is holding the riem attached to the legs pull on it until the legs are slightly further forward than at right angles to the body. The site of the operation is then exposed. It lies in the angle formed by the leg and the lower edge of the innominate bone, immediately behind the former and about two inches below the latter. The innominate bone can be felt as a distinct ridge running backwards and slightly downwards about the middle of the body, immediately behind the leg; it corresponds to the lowest part of the body on which any feathers, with the exception of the small belly feathers, are found. It is immediately below and parallel to this ridge that the incision is made.

The operator should now wash his hands and the site of the operation with some disinfectant. Make an incision about four inches long, commencing immediately behind the leg, and cutting backwards, running parallel to and about two inches below the ridge mentioned above. Cut down until the peritoneum or thin membrane covering the bowels is reached. If the birds are in fair condition the peritoneum will be found about half an inch from the surface, whereas if they are in very good condition several layers of fat, in addition to the thin layer of muscle, will be found between the skin and peritoneum. It is recognised by its bluish tinge; and having reached it, make a small hole through it and insert one finger, pull it outwards away from the bowel and enlarge the opening to admit the whole hand.

Pour a little carbolic oil over the right hand, and force it gently through the opening into the abdominal cavity.

The testes are easily located about three inches further forward than the incision, almost exactly between the upper extremities of the legs, situated on and closely attached to the roof of the abdominal cavity.

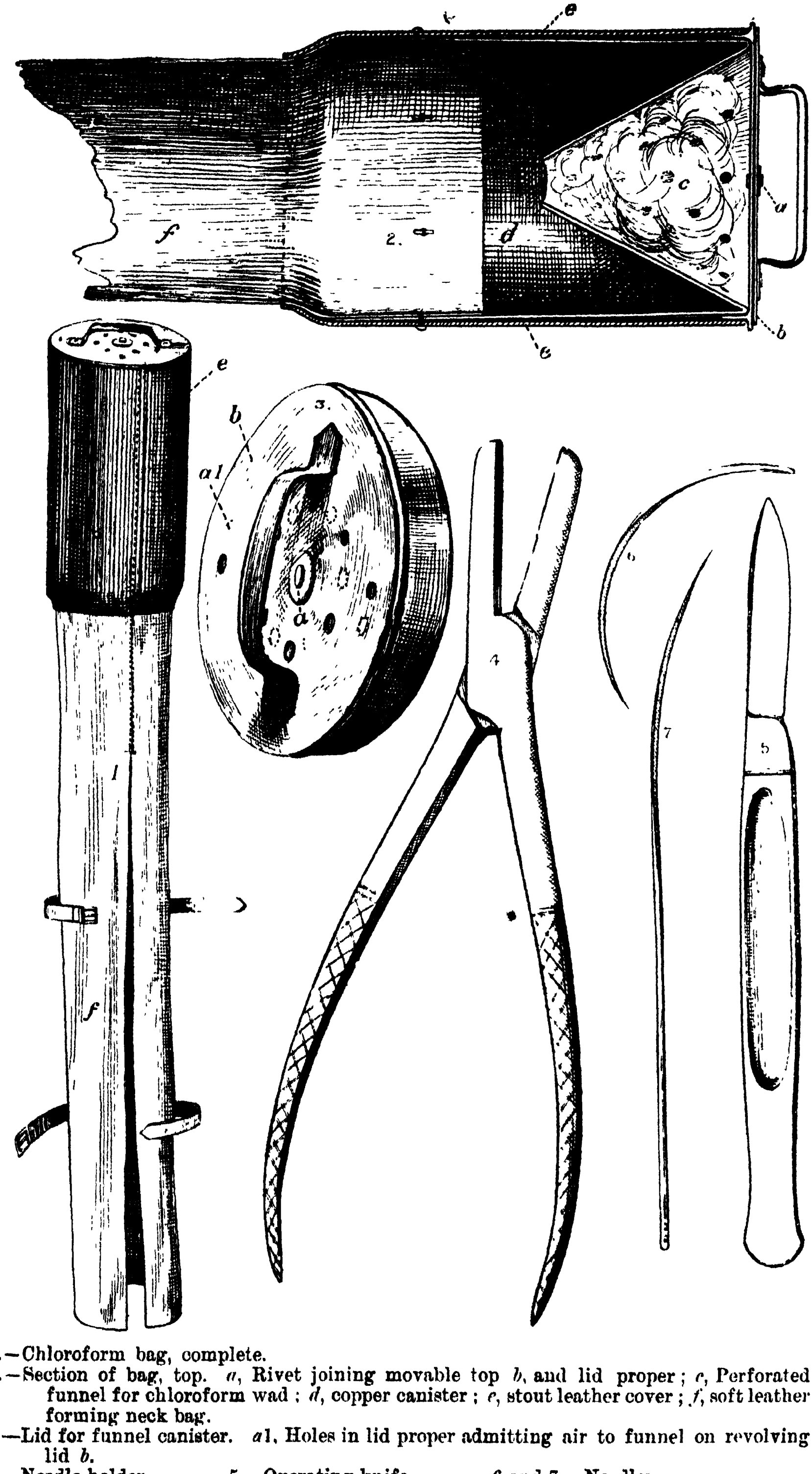
In birds not yet fully mature they are felt as two elongated, firm structures, about one and a half inches long by a quarter of an inch broad, somewhat in the shape of a ·303 bullet. In older birds, or those which are breeding, the testes are enormously developed, and resemble in size and shape a large duck egg. They lie about two inches apart, the left usually slightly further forward than the right.

Having located them, the tissue round about is easily broken down by the fingers, and a few twists liberate them, and they are withdrawn in the palm of the hand. Both testes should be located before either is removed. It will be noticed that a thin membrane intervenes between the two; it is necessary to break this with the finger before the lower one can be withdrawn.

Hens are likewise thrown on the left side, and the incision made as in the males. In birds it must be remembered but one ovary is developed. It is situated in the same position as the left testicle of the male, and in birds which have not yet started to breed it is felt as a bunch of small grapes growing from a thin membrane which is firmly attached to the roof of the abdominal cavity. This is grasped between the finger and thumb and stripped from its attachment, care being exercised to remove the whole membrane, as if a portion remains, the eggs may start to develop again.

If much hemorrhage has taken place internally, swab out the abdominal cavity with a few clean pieces of cotton-wool.

Having removed the testes or ovary, take the small needle and catgut and joint the edges of the peritoneum with three or four interrupted sutures, taking care not to prick the gut in so doing. The safest way is to put two fingers of the left hand inside the wound and draw the peritoneum outwards. The skin and muscles are now included in four inter-



1.—Chloroform bag, complete.
2.—Section of bag, top. *a*, Rivet joining movable top *b*, and lid proper; *c*, Perforated funnel for chloroform wad; *d*, copper canister; *e*, stout leather cover; *f*, soft leather forming neck bag.
3.—Lid for funnel canister. *a*1, Holes in lid proper admitting air to funnel on revolving lid *b*.
4.—Needle holder. 5.—Operating knife. 6 and 7.—Needles.

rupted sutures of quarter-inch tape, and the operation is complete. It will probably be found necessary to use the needle-holder for these last stitches, the large needle and tape being difficult to pull through the skin with the fingers.

Remove the chloroform inhaler and place the bird in a natural position, as when lying down, that is on the middle of the chest. If the legs are pulled out a little to either side, he will remain in this position until able to rise.

This is important, as if left lying on the side he will have great difficulty in rising, and in struggling to do so the stitches may be broken and a rupture result.

On no account frighten a bird up; allow him to lie quietly until he chooses to rise.

The breathing should be watched throughout the operation, particularly during the first five minutes that the bird is receiving chloroform. It should be steady and regular; should it become jerky or irregular, open the end of the inhaler and admit more air.

After Treatment.

For the first two days after the operation the birds should be placed in as quiet a camp as possible, where they are not likely to be frightened or made to run.

When there is a large number of birds to be operated upon, a reliable assistant and two extra boys should be at hand, in order that a second bird may be thrown and chloroformed whilst the first is being operated upon.

On one occasion the writer operated upon fifty birds between seven a.m. and five p.m. There was, however, unlimited assistance at hand.

The following letter written by the Oudtshoorn manager of Messrs. Sciama & Co., the well-known feather merchants, speaks for itself:—"Dear Mr. Elley,—*Re* the feathers of the male ostrich which was castrated by you about fifteen months ago, I have examined the black feathers (plucked, eight months' growth, as stated by Mr. P. S. Heyns, of Mount Hope, George, upon whose farm the ostrich was kept), and find the blacks to have a good, bright lustre, quite equal to that of an ordinary *good* bird's feathers. I am pleasantly surprised at this, as I fully expected the feathers to be dull, and to have lost that lustre which is of great value. Wishing you further success in your valuable experiment,—Yours faithfully,—A. E. Martin."

EXPERIMENT STATION REPORTS.

THE AGRICULTURAL EXPERIMENT STATION, EDINBURGH, KNYSNA, C.C.

THE INITIAL FERTILITY OF A SOUR VELD SOIL.

The unsuitability of raw sour-veld for crop growing is generally recognised, but for the purposes of an enquiry such as the present, this point had to be tested and demonstrated, else later a doubt might be thrown on the characteristic or typical nature of the experimental areas.

Newly broken land was accordingly prepared for seed, and without any fertiliser being applied, a number of crops were sown in long narrow strips, side by side, so as to include if possible any local differences of soil which might occur and mislead the conclusions. The recognised crops of the district were sown side by side with others known to be the least exacting, and as such grown on the poorest classes of soil elsewhere, *i.e.*, rye, lupins and buckwheat. The aim being to measure the inherent capacity of the soil to support crops in its raw state and unaided by fertilisers. In the first season the land was variously tilled: (1) ploughed once, (2) ploughed, cross-ploughed and harrowed, (3) ploughed, rolled and cross-ploughed, and (4) ploughed, rolled and harrowed, and each of the seed sown on the variously worked patches.

Seaview Camp, where this experiment was conducted, was patently poor and sour, with a gentle slope away from the sun and towards the sea and had in the past been frequently burnt over by veld-fires, hence the natural covering was poor, short, and scanty. The soil is a thin loamy sand, and deep ploughing would bring up the close textured yellow sandy subsoil. Nothing in the way of payable crops was expected under such conditions; and the results attained testify to the utter poverty of the land, and its present unfitness for profitable cultivation.

Rye, the cereal *par excellence* for sandy and poor land, germinated well, and came up fairly thickly, grew slowly to a height of six inches, and bore stunted ears containing two or three grains apiece. Otherwise it was quite healthy.

Oats germinated poorly, but grew similarly to rye, assumed a reddish tinge, remained short, and gave no yield at harvest time.

White and Alsyke Clovers germinated poorly and died out, except in wet hollows in the surface, in the shelter of clods or the like, where they clung to life, but never grew above an inch in height.

Turnips did rather better than any other crop tried, germinating well and in spite of attacks of the fly at an early stage they ultimately developed small roots; not to be reckoned as anything of a crop, however.

Rape grew irregularly from 1 inch to 6 inches high, also suffering from the fly, generally failing, but in a few spots making quite an active growth, the final result being fair and better than might have been expected.

Buckwheat is a crop capable of growing on the poorest of soils. Though only growing 3 inches to 4 inches high, it struggled into flower, but had a weak and sickly appearance, and red colour of leaf betokening an unsuitable environment.

Serradilla, another unexacting plant, failed altogether.

Lupins came up thinly, seemed to remain healthy, but did not grow above a few inches high.

Vetches, another leguminous soil improver, started well, but never reached maturity.

Cowpeas also refused to grow after the first start.

The crops were left to run their natural course, and all died out about the middle of January. Purposely no manure was applied, the soil being given an opportunity of showing its innate unassisted powers.

The conclusion come to is that on the soil in question, when newly broken up, and without fertiliser, not even the hardiest crops and those known to thrive on poor soil can be grown successfully. Other trials confirmed this.

Grasses such as brome grass, which does almost anywhere; cocksfoot, rye grass, timothy and paspalum, maintain themselves alive, but show no profitable growth.

On a somewhat different piece of ground, a damp vlei possessing a fresh, humus, sandy soil, resting on a dense clay subsoil, many of the same crops were tried somewhat later on in the year. Buckwheat, serradilla and lupins virtually failed, though not so completely as those abovementioned, the white lupin indeed grew passably well, far better than its yellow and blue congeners which are generally regarded as the hardier forms. Experiments with these crops assisted by fertilisers, will be dealt with separately. The more exacting crops such as potatoes, wheat, and mealies, when without fertiliser in other experiments, all failed completely, as was to be expected. On a small scale this experiment will be repeated annually on the same land, in order to ascertain whether by the slow process of repeated ploughing without extraneous enrichment, the soil will not become sufficiently "sweet" to support one or other of the more accommodating crops. At the same time the relative growth of the crops tried will be a measure of their relative demands upon the soil. Perhaps it will be suggested that these results might have been foreseen, and the experiments were unnecessary. Such argument is fatal to the whole principle of experimental science in which nothing can be assumed without proof. Failure of the crops was expected, but had to be demonstrated. Conclusions must be built up on a series of successive steps, and it is the misfortune of agriculture that as a rule only one such step can be taken in any particular enquiry in one year.

VELD EXPERIMENTS.

In connection with the study of the natural veld a number of separate enquiries are in progress, but from the nature of the subject they do not yet admit of the submission of detailed reports. In one series of experiments an attempt is being made to ascertain what the effect of successive burnings at different dates is upon the bush and grass. Many different ideas are held on this subject, and it will be of interest to learn how far the common ideas upon this vexed subject are true. Careful record is being kept of the progress of this experiment which, of course, must take several seasons to complete.

Another line of enquiry is as to the mutual effect of bush and grass. On a piece of rough veld possessing a very mixed herbage particular sorts of bush have been removed to ascertain how far its presence was hurtful to the grass. So far as can yet be seen the grass is suppressed and prevented from growing by the overshadowing of the canopy of foliage rather than by the directly injurious effect of any of the bushes. The taller, lighter top bushes admit of the spread of the grasses, the denser lower shrubs suppress it. Could the bush be cheaply eradicated by some process other than burning, which destroys grass seed as well, probably the grass would very soon assert itself.

The encouragement of the grass on cleared land by means of artificial manures has also been tried both on land regularly grazed and on land kept clear of all stock. Of the various fertilisers applied the only two which showed results to the eye are lime and guano, and these appear to assist the bush as well as the grass. On the ungrazed portion the grass may in time choke out the bush, but several seasons must elapse before a definite conclusion can be reached.

Similarly patience must be practised in watching the ultimate effect of ploughing with different ploughs, subsoiling and cultivating patches of raw veld subsequently left to themselves in order to determine what herbage will naturally spring up thereon and how far the pasturage is hereby improved.

It is desired here only to indicate the lines along which these veld experiments are being conducted. Fuller accounts of any practise which may appear to commend itself will be furnished on a future occasion.

MANURIAL EXPERIMENTS WITH PASPALUM DILATATUM.

Within the brief space of a couple of years Paspalum dilatatum, the grass known in Australia as Golden Crown, has suddenly come into prominence, and while perhaps not realising the fullest expectations of over-sanguine optimism, it has yet belied the sceptics and must without doubt now be recognised as a potent aid to farming and a valuable addition to our few artificial grasses.

Where lucerne thrives no other crop is necessary, but there is yet much land eminently suited to Paspalum and on which that grass will prove an undoubted boon both for hay and pasture. The precise range, the proper seasons and the best soils for Paspalum have not yet been definitely decided, though much in these directions has been learnt. At Knysna the grass is showing a partiality for clay soils, but on humus sand and on bush soil it presents certain features full of interest and even somewhat surprising.

Slips were brought from the Western Province and planted in different situations in the months of June and July The grass held its own, but grew little until the warm weather set in. What was simply notched in with the spade in a grassy piece of ungrazed veld grew slowly and flowered in due course, but has not as yet suppressed the neighbouring natural grasses. Its progress a second season under such conditions will yet have to be watched.

Another plot similarly situated but subjected to frequent nibbling by stock and purposely unprotected remained short and formed very stout tussocks, but appeared actually healthier and more vigorous than plants close alongside but within an enclosure, in well-tilled soil and kept clear of weeds.

This, along with similar experiences elsewhere, points to the fact, true of many grasses, that with a certain amount of grazing and treading they are actually better than if left to themselves.

In a well prepared piece of land about one thousand slips were planted out in 2 foot squares on the 28th July and treated with various fertilisers as follows, applying in each case 250 lbs. per acre:—

Plot No. 1.—Ashes (burnt bushes, grass, etc.).
„ „ 2.—Guano, from adjacent cliffs along the coast.
„ „ 3.—Stable manure, fresh.
„ „ 4.—Government Guano.
„ „ 5.—Basic Slag.
„ „ 6.—Ash and Lime, 250 lbs. of each per acre.
„ „ 7.—Superphosphates.
„ „ 8.—Nil. Control Plot.

The results are most interesting.

After two months (26th September), judging by appearances, basic slag appeared the best plot, with superphosphates and guano good seconds and third, while the rest were very backward. One month later the other plots looked well, standing 3 feet high and flowering, but the two treated respectively with ashes and with local guano still hung back. On the 17th January the three plots manured with ash, with stable manure and with a mixture of ash with lime looked green and healthy, whilst the other plots, better before, now looked sickly and seemed to be turning yellow. Another month and these plots failed, while the three mentioned above were strong and healthy. A complete reversal of the earlier order had taken place. The ash and lime plots looked quite the best, the ash alone next, with the stable manure still showing up well. The crop was cut at this stage and fed to the horses and appeared to grow the better for having been harvested. On the 25th April, just nine months after planting, the guano and the slag plots were quite dead, while much had perished in the superphosphate plot. A few plants had failed in every plot except the ashes plot, which looked the best of all. But the complete destruction of the grass in certain plots was very striking and undoubtedly due to the manures applied. On the 1st of June the differences were the same, but accentuated; whilst in addition on the ashes and lime, the ashes, and the stable manure plots and also to a lesser extent on the superphosphate plot, self-sown seed was coming up. On the remaining plots none was to be seen. This second crop will be allowed to grow up so as the more thoroughly to test the various plots. The altogether unexpected results of this experiment have suggested the extended trial of wood ashes as a manure for Paspalum on these soils, while another adaptation is to try planting and sowing Paspalum on land newly burnt to see whether the ash supplied in this rough and ready way will also benefit the grass.

Yet another curious result was obtained on a piece of damp bushy ground in a steep but cool and shady piece of land facing away from the sun. Here close to the forest Paspalum did poorly. After nine months most of the original plants were dead, yet in their places in the month of May there appeared a dense sward of young self-grown Paspalum. The progress of this patch will be closely watched, as possibly the seedling will thrive where the planted slips perished.

Whether Paspalum will prove the best grass for the Knysna is still uncertain. Others are at least equally good at present, yet it appears likely to become a recognised grazing grass on account of its strong tufts with numerous succulent young shoots, and it promises to form one of the several grasses suitable for sowing together for permanent pasture. Paspalum came away splendidly in seed-beds, and there will be an abundance of plants available for further experiments in the coming season.

EXPERIMENTS WITH GRASSES.

Indigenous and Introduced.

The mild humid climate of Knysna suggests its adaptability for grasses and the success of artificial pasture and meadows of grass hay would be a great gain to the district. Experiments in this direction are being made, and while it is yet too early to say that all the difficulties have been overcome, yet the results now before use leave little room for doubt that in a few seasons time, ways and means will have been determined for converting land now covered with hard innutritious bush into grass lands.

Various grasses which have suggested themselves as being possibly useful are now under trial.

(*1*) *Indigenous Grasses.*—Indigenous grasses claim first attention, and especially local varieties. The advantages of using Cape grasses is obvious, but so far they have proved shy in germinating, and as a rule slow growers. Additional ones are now being tried, and the experiments with all will be continued. The most encouraging result to date with indigenous grasses is undoubtedly that with Rhodes' grass, *Chloris gayana*, which has been experimentally sown for several years in different parts of the Colony with considerable success, and has established itself most thoroughly and successfully in certain portions of the Queenstown district. It resembles quick grass in spreading, by means of runners which throw out roots at every joint, and spreads rapidly. Unfortunately the seed of this grass is virtually unprocurable, and is not stocked anywhere. The good quality of this South African grass has long since been appreciated in Australia, where it is to be bought from seedsmen. Extended sowings are being made of this promising Colonial grass.

The following grasses were sown in July, but none came up until the following November. This seems to point to October as being the appropriate season for sowing indigenous grasses, whereas April and May seem the best time for imported grasses.

The grasses here mentioned grew slowly, and never became very large or luxuriant. While meriting continued trial, they cannot yet be generally recommended.

Anthistera imberbis, rooi gras, perennial, is probably the best known of the natural grasses in the Cape Colony. It grew during the summer well, but seemed weak during the winter. It is found naturally in the veld at Knysna, but in limited quantity only, whereas in some parts of the country it is a main constituent of the pasture.

Eragrostis curvula, blauw-zaad gras, a perennial, did not do very well, although elsewhere it is known to be a vigorous and valued natural grass.

Pentaschistis curvefolia, *Pentaschistis euadenia* (annual), *Pentaschistis Thünbergii* (perennial), a failure.

Ehrartia calycina (perennial). *Danthorpa stricta* (perennial).

Eragrostis brizoides (perennial). This is a promising summer grass, probably better suited for pasture than for hay.

Aristida capensis. A failure.

Brizopyrum capensis (perennial). Looked well in the summer, though weak in winter.

Foreign Grasses.—More is known of the character and habits of exotic grasses than our own indigenous varieties, which seem in the past to have aroused far too little attention. In introducing foreign grasses, the main points to be ascertained are those of proper sowing season and suitable locality. The grasses mentioned below were sown on a piece of bush ground formerly used as a vegetable garden, and at the same time on a poor

patch of ground recently broken up. On this latter land, sown in September, all the grasses maintained themselves alive, but have made very poor growth, and seem stunted and sickly. They will be left for another season to determine whether they will not establish themselves during the second year as grasses are often known to do. In the long-cultivated land, sowings were made fortnightly throughout the year so as to give the grasses every chance, and to determine the best sowing season. The ground chosen had for some years past grown mealies and pumpkins, and was very foul with weed seeds, which interfered materially with the grass. The reports cannot therefore be regarded as quite final, but so far as they go are instructive and interesting.

Cocksfoot Grass (Dactylis glomerata), has given a good account of itself in most parts of the Colony where grasses will grow at all, and as a strong vigorous grass growing in tufts, it should hold its own against all other grasses and weeds. At Knysna it has done best of any of the European grasses for grazing, and also in struggling with the weeds, but for hay was inferior to rye grasses. From frequent sowings it would seem that March, April, May, August and September are the most appropriate sowing months. Sown alone, about 28 to 30 lbs. of seed per acre will suffice. The grass stood 15 inches high, and gave a good crop of hay in the middle of January, and a few weeks after cutting it afforded capital grazing. The May and other winter sowings suffered more from weeds than did those of September and October. Cocksfoot grass may confidently be recommended for the formation of artificial pasture, either alone or with other grasses. Suitable mixtures will form the subject of separate experiments later on.

Timothy Grass (Phleum pratense), has also been sown fortnightly throughout a year. It proved even better for hay than cocksfoot, and when cut in flower in January was standing three feet high. May, August and September sowing did best, but this grass is more susceptible to injury from weeds than is cocksfoot, and was considerably damaged thereby. Timothy requires rich soil, manured, clean, and a very fine seed bed. Only 10 to 12 lbs. of seed is sown per acre. It is a somewhat delicate grass, and young plants were burnt up during the heat of the summer. That sown on new poor land was a complete failure.

Meadow Grass (Poa pratensis) did not do at all, although sown throughout the year. Naturally a short low grass, it withstood neither drought, heat, nor weeds as well as other grasses, and only answered moderately well in very moist ground. Its growth was not such as to warrant further trial.

Perennial Rye Grass (Lollium perenne).—The three varieties of rye grasses all gave good cuts of hay of the very finest quality, which is greedily eaten by stock. Fortnightly sowings throughout the year were made. The most successful sowings were in March, April and May. September also proved a suitable month. It grew better in the summer than in the cold season. These grasses grew little after cutting, and were easily overpowered by the weeds. On very poor soil they failed.

Italian Rye Grass (Lollium italicum), is only annual, and gave but one very fair cutting for hay six months after sowing. On the whole it answered better than the perennial variety, especially the August and September sowings.

Devon Evergreen Rye Grass, recently introduced, did well from sowings made from January to March, but from the beginning of April onwards has not succeeded. It promises to be the best of the rye grasses yet. Rye grass may be sown at the rate of from 30 to 40 lbs. per acre.

Rescue Grass (Bromus unioloides), is common in gardens and orchards all over the Colony under different names such as Winter grass, Tuin grass,

Van der Merwe's grass, and so on, but seldom receives the attention that it deserves.

Although only an annual and not very vigorous, yet on account of its hardiness against cold, and the fact that it thrives best in winter time in moist situations, it is likely to form an important element in grass mixtures and deserves continued attention.

Paspalum grass is becoming so well known that it will soon have passed completely beyond the experimental stage in so far as its suitability to different portions of the Colony is concerned. Much remains to be learnt, however, as to the best modes of propagating it, as great difficulties have been met in establishing this grass, even in places where it grows luxuriantly. At Edinburgh (Knysna) paspalum has been tried under a great variety of conditions. The seed was found to germinate best during the warm months from September to March. Sown broadcast the crop has proved somewhat precarious, and although planting out is laborious, yet it is the surest method. If given a good seed bed, and kept moist and warm, 300 seedlings can be produced on a square yard, and these in time planted out when 3 to 5 inches high, rapidly increase in size, and in a few months yield 20 to 30 slips apiece. The slips may conveniently be planted out 2 feet apart each way, or if the ground is to be horse hoed, 3 feet by 2 feet is best. Paspalum seeds freely, and this self-sown seed is coming up densely in places, even where the old plants have died off. Perhaps these seedlings will prove better suited than the original slips. The grass does least well on loose humus ground, and seems positively to do better where subjected to treading and eating down by stock. On heavier clay soils it has so far done better than on light land.

So far paspalum is quite the best of the imported grass tried at Knysna, and its experimental cultivation will be continued vigorously.

Tall Oat Grass (Avena elatior) has only been sown since January 1907, and so far March has proved the best month. It promises to be one of our best grasses.

The following grasses from New Zealand are also being tried on a small scale, but have not as yet been sufficiently long under observation to allow of a verdict being formed. Mitchell grass, Wallaby grass, Meadow Rice grass, and Blue grass. Like our own grasses they seem very slow in commencing growth. So far the following may be reckoned as successful:—Cocksfoot, Timothy, Italian Rye grass, Rescue grass, and Paspalum (Golden Crown grass), while most of the others at least deserve continued trial.

VARIETIES OF POTATOES.

A humus sandy soil is one upon which potatoes might naturally be anticipated to thrive well. Old bush ground, especially where some burning of scrub may have taken place should prove a suitable potato soil. Such areas are common in the Knysna and occur on the Experiment Station. Comparatively new soil is less suitable than that already under cultivation but had to be utilised for want of better. At present the Early Rose is the prime favourite, and this popular verdict is confirmed by its position when grown under identical conditions alongside a selection of the best-known varieties procurable. Early Rose was, however, closely followed in these trials by Reliance and Sir John Llewellyn, while one or two others mentioned in the list, though less prolific,. deserve special atten-

tion in view of their promising power to withstand the disease. For the sake of brevity and clearness, the chief results have been brought together in the following tabular statement:—

Comparative Trials of Varieties of Potatoes at the Agricultural Experiment Station, Edinburgh, Knysna, 1907.

Variety.	Yield in pounds per acre.				Remarks.
	Ware.	Seed.	Chits.	Total.	
French Early Rose	9,520	7,735	7,114	17,969	Planted 15/1/07. Healthy up till 8/3/07. Disease noticed on the 14/3/07. Severely attacked when lifted on 21/3/07. Somewhat waxy when cooked.
Sutton's Reliance .	6,208	11,640	...	17,848	Immature, not very good eating. Attacked by disease.
Sir John Llewellyn	8,470	8,833	...	17,303	Severely attacked by disease.
Ninety-fold ...	7,760	7,980	420	16,160	Killed by disease before lifting.
Royal Kidney ...	4,114	11,011	...	15,125	Free from disease, excessive proportion of seed size. A very good mealy table potato.
Up-to-date ..	5,824	7,280	...	13,104	Slightly attacked. Very good table variety.
Flourball ..	3,696	8,736	...	12,432	Slightly diseased. Immature. Somewhat waxy when cooked.
Supreme ...	...	11,132	...	11,132	Very much attacked by disease. None really the size of eating potatoes though only latterly.
White Elephant ...	..	8,936	..	8,936	Attacked by disease, weak growth.
King Edward VII	3,136	4,040	..	7,176	Much attacked. Good eating.
Magnum Bonum...	..	4,928	.	4,928	Diseased latterly, sufficiently to arrest development.
Wyatt's Ashleaf ...	...	4,110	...	4,110	Weak growth, apparently unsuitable, though only recently attacked.
Sutton's Ashleaf...	...	2,912	...	2,912	Ditto.
Field Ashleaf ...	...	2,783	...	2,783	Ditto.

The seed of these varieties was planted on two different dates. The first attempt was made on the 3rd November, 1906, but was a comparative failure on account of the very wet weather which followed. Disease killed all some time before maturing, and the results are in consequence unreliable. Fifteen sorts were planted also on the 15th January, 1907. These with few exceptions did well. Owing, however, to the appearance of the potato blight, the so-called rust (*Phytophthora infestans*) all the crops failed to mature properly, hence the large proportion of seed and chits, unsized tubers to ware, the saleable product. On the first appearance of the disease the plants were sprayed with Bordeaux Mixture, which no doubt lessened the extent of the injury committed. A number of other sorts were tried, but they without exception succumbed to the infection. This is possibly attributable to unfavourable weather conditions during the growth, a difficulty hardly to be overcome in so erratic a climate as that of Knysna. The sorts which proved unsuccessful when planted in the month of November were Evergood, Maincrop, Hanf, Duke of York, Sutton's Abundance, Beauvais Institute and Imperator. The occurrence of disease is so probable, so almost certain, that spraying at short intervals regularly, as both a preventive and cure, seems likely to become as necessary an operation as hoeing and earthing up. In Europe this fact is recognised, and

the spraying of potatoes is regarded as a necessary part of the cultivation of the crop without which a fair return cannot be relied upon, spraying becomes as it were an insurance of the crop; a small outlay to render certain the return of a full harvest.

FODDER AND ROOT CROPS.

For abundance of succulent green fodder the cabbage tribe are firstly by nature and further by artificial selection especially adapted. There are various members of this and allied families deserving to be much more widely known than is at present the case. Although naturally gross feeders preferring heavy dunging, yet they did phenomenally well on the poor sour soil augmented with 300 lbs. of guano per acre.

Hardy Branching Kale, both at Edinburgh and elsewhere, takes pre-eminence in this respect. Sown throughout a twelve month it failed consistently till the hot weather of December, January and February, and the crops sown then did remarkably well. This variety did better than those mentioned below and was faster in growth. All Kales seem to like a fresh soil and to become shrivelled, and a prey to insects on dry land.

Thousand Headed Kale, like the above, only grew slowly throughout the winter up to November, being infested with aphis, diamond back moth, and other insect plagues. December sowings grew slowly and gave a fair crop. From January onwards the Kale grew rapidly and gave a splendid crop of green fodder.

Branching Kale was similar in habit, and, though good, was not the equal of the above two.

Winter Rape furnished a good crop of juicy green food, and proved quite successful. December and January sowings did best. February and March were not so good, and April and May gave only fair results.

Summer Rape did best in November and December, earlier attempts being all much injured by insects. Although quite satisfactory it did not yield the return of Winter Rape sown in December. From these results it would appear that the nomenclatures of European use for these varieties are out of place here.

Essex Rape seems about as good as Winter Rape, but grew more slowly, and did comparatively better in the winter months of March, April and May.

White Mustard is best suited for use as a green manure, especially when sown in March, as it then grows best and escapes the insects which at other seasons appear to devour it in preference to anything else.

Turnips, of which a number of varieties have been sown, are not yet in a state sufficiently advanced for report.

Sugar Beet has not done well so far although sown every fortnight. From March sowings the plants developed best, and have been transplanted out.

Buckwheat was sown fortnightly throughout a year, and it became clear that March and October are the most appropriate dates. As frosts kills it, probably the latter will be the safest time to sow. Buckwheat promises well growing to a height of 18 inches and looking healthy. The seed ripens evenly, and is probably here best suited, like White Mustard, for use as a green manure.

VACATION COURSES IN AGRICULTURE.

AT RHODES UNIVERSITY COLLEGE.

(Continued from page 563.)

LECTURE No. V.

THE BREEDING AND GRAZING OF ANGORA GOATS.

By C. G. LEE, President Inter-Colonial Agricultural Union.

Rhodes University College Council, having invited me to lecture, and so assist the Council in their laudable venture of these vacation agricultural courses, I at once agreed, nevertheless with much diffidence and some misgivings, but my mind was somewhat set at ease when it was thought well that I would take the subject of "The breeding and grazing or merinos and angoras, and points of interest and value in the mohair fleece." On this subject I felt I might add my mite, by endeavouring to assist those who are aiming at imparting such information as will tend towards making the country's merinos and angoras of the best possible quality, especially in point of stamina, strength of constitution, power of frame and uniformity of character and quality of fleece. The fact is universally admitted that bad stock kept where good ones could graze and be bred is a loss, because the bad eat as much as the good, while they produce less. Further, bad stock act detrimentally upon the future, by reproducing themselves. Notwithstanding this accepted fact, the past history of this Colony shows that the very great importance of improving stock has been greatly underrated. At the same time allow me to add there exists large numbers of praiseworthy exceptions. These go to prove beyond all doubt that the Colony's pastoral and climatic conditions are in every way most suitable and favourable for producing the best in merinos and angoras.

BREEDING AND GRAZING.

Merino and angora farmers, as a general rule, are breeders of a select stud flock, while at the same time they graze other stock, more for fleeces and mutton. This certainly appears to be a wise course, where practic-

able, because each farmer by this method breeds from his stud flock the required sires for his general shearing flocks.

Besides this advantage, the breeder has often a number of sires not required for his own flocks, and is then in a position to sell same. If he is a breeder of repute these sales prove very remunerative, especially to those who have established a good reputation for themselves. However, it matters not whether a farmer breeds stud stock or only grazes stock for fleece and mutton, or combines both, in all cases it is absolutely necessary that he should understand at least something of the laws affecting and governing stock-breeding, and the more thoroughly he understands these laws the better for himself and the better for the country generally. Again, if the young farmer be wise he will, besides studying these laws, train himself to examine closely his powers of observation, that he may prove himself if he be capable of close observation, particularly with regard to the minor points of difference, as well as the more apparent ones, in his stock.

It must always be remembered "Money may buy pure-bred stock, but the breeder to be successful needs something besides, and vastly different to gold." He needs a great aptitude for observing specialities in animals, although these may be scarcely perceptible, and more than this he needs a gift for mating animals of given qualities to effect improvement. It is a well-known fact that some possess naturally this aptitude and gift Nevertheless, let no young beginner be discouraged, because by close application and studying the laws governing stock-breeding much success can be attained, I can safely say, even great success. But the beginner should never overlook the fact that nearly all the great stock breeders look upon their animals as something more than so many money-making machines They have a kind of affection for their stock. Such a deep interest is cultivated—if not naturally possessed—by studying each individual of the stud flock, that the feeling almost amounts to a form of love for the stock —in fact, it is that. It is the deep interest that makes the successful stock-breeder; besides it makes the science of stock-breeding of the deepest interest, and affords much pleasure. The studying of the animals' habits, its wants and characteristics and differences. These factors operating upon the mind of the breeder, surely enough the aptitude and required gift will come, not, of course, to each in the same degree, but still sufficient for each to make stock-breeding a success. But to return to my point. The science of stock-breeding has for its basis very important natural and fixed laws, which must be accepted for guidance, and which cannot be ignored without serious loss and far-reaching disappointment. For instance, anyone attempting to breed very large-carcased merinos or angoras on very poor or scant pasturage by continually introducing large-carcased sires into the flock is bound to meet with disappointment, because there is not food supply sufficient for the size of the animal's frame, whereas a smaller animal would perhaps do splendidly, yielding good profit upon this very same veld where the large one failed utterly. The great law to study is that of

Heredity.

"Like begets like." Truly it has been said: "The offspring is not the offspring of father and mother, but of grandparent as well." The goal to aim at and desire of the stock-breeder must ever be to so breed his animals that each succeeding generation will come nearer to the ideal he is breeding for. Each generation to become more true to type and kind. The power of heredity is strongly shown in wild undomesticated animals. These gradually come true to their parents, even to a hair almost. The

law of heredity produces "throw-backs," a term used to convey the fact of the appearing of undesirable progeny in a desirable flock, meaning that some of the flock are producing stock which revert back to some undesirable ancestor. This law of "throw-back"' or "reversion" is the one most dreaded by stock farmers. It means two undesirable animals are mated, and the progeny is undesirable. This signifies that either one or the other of the parents, or perhaps both, are not to be trusted to breed true. "But when once a family of animals become pure bred or thoroughbred they possess great power in reproducing their exact type generation after generation." It is assumed that the goal of the breeder is to so breed his merinos and angoras that *all* produce fleeces of uniform type, it being admitted a uniform clip of wool or mohair is worth much more than a clip of the same weight, but mixed in character.

The point to aim at then is to breed each individual animal in the flock alike and thoroughbred. This is the problem for the young beginner. The question is

How to Start,

and how to maintain a thoroughbred flock? The fixed laws governing stock-breeding leave the beginner but one way. And this (as the late Mr. J. B. Hellier says) "to mate animals that are alike in all points; not only in appearance themselves, but whose ancestors have answered to the required characteristics to at least some degree." The greater the degree the better.

Now, since it is next to impossible to get two animals as closely resembling each other as animals that are related, the system of in-and-in-breeding has been adopted by most of the noted breeders of the past and present times. Experience proves to me that it is the safest system upon given lines and up to a given point. Could it be possible to obtain two animals (sire or dam) in every particular similar, without being related, they would be equally safe to mate, and certainly preferable to related ones, but it has already been stated that such is next to impossible. Mr. Hellier truly says: "There's no magic in the sire and dam being nearly related, but the value of the union lies in the fact that they each contain in themselves and inherit from their ancestors precisely the same qualities, and their progeny will in all probability have the special and valuable characteristics of their parents intensified." It may be asserted with the utmost safety that to breed in and in with perfectly healthy merinos or angoras is the right highway to success in securing the much-coveted and very valuable thoroughbred animal. But the breeder is warned in the strongest possible language to beware of the evils resulting from close in-and-in breeding with faulty animals. Because, as all know, in-breeding is a two-edged sword. It cuts both ways. It intensifies and fixes not only the good qualities, but it also intensifies the bad qualities and weaknesses.

The difficulty does not so much lie in the outward and therefore more readily discernible faults and weaknesses, as it does with the more subtle and more undiscernible weaknesses of the inward organs, which weaknesses are nevertheless transmitable to progeny.

The terrors of in-breeding rest upon these inward faults of the respiratory, circulative, digestive, and other systems. And it is these that have driven many a stock breeder away from the method of in-breeding. Preferring the risks of continually introducing new blood, first from one breeder, then from another, which causes great variety of fleeces in the majority of cases. Of course, there may be exceptions, but they are far too few. I cannot leave this point of the dangers of in-breeding with faulty animals without giving Darwin's warning: "The evils resulting from close in-and-in-breeding are difficult to detect, for they accumulate slowly and

differ much in degree with different animals." Though I am an advocate of in-breeding healthy animals as the shortest and the surest method of securing a thoroughbred flock, nevertheless I unhesitatingly believe there will come a time to "call a halt" in the system, even if healthy individuals are mated. I mean there will come a time when new blood must be brought into the flock, but not before your flock is pure bred, and therefore possesses strong prepotency.

I will not lay down the time when this new blood will need to be called in; that would be more a question for each breeder to decide for himself. Then again no rule could be laid down, because with one flock the change of blood would be needed sooner than with another flock. To introduce new blood into any thoroughbred flock is a step always fraught with danger, more or less grave, because the work of years may be lost in one season. If the breeder is perfectly sure of the pedigree, if he has a wide field of pure bred flocks to select from, if he can with certainty record the strain from which he is selecting, and has had the opportunity of knowing it for a considerable period, then at least some of the chief risks are removed, but not all. To minimise the risks when bringing in new blood a well-governed stud book is the only factor that can materially assist the breeder and the country.

Unfortunately for this country, no such stud book has been in operation, till recently the South African Stud Book was launched, and is doing good work, but is far too young an institution to cover the ground I refer to, and, moreover, its rules will have to be made much more strict before it can hope to fill adequately the gap that needs filling. But I, for one, am full of hope, because the breeders are rapidly closing the doors which admit the faults. One great accomplishment of the South African Stud Book is: That its first volume—and I trust succeeding volumes—has set before all breeders the names and addresses of a large number of stock breeders. This gives material assistance at any time when new blood is required.

I wish to observe that I agree with those who believe that the evils of in-breeding have been, and still are, more fully discussed than the advantages. Hence the system is viewed with a greater amount of disfavour and suspicion than the real evils warrant. There is this great advantage in breeding the flock pure: all the lambs and kids produced tend each year to consolidate and add to the permanency of the marked and desired characteristics of each individual in the flock as time goes on.

The powers of heredity demand that every stud stock breeder should be a keen observer of even minute differences. He will then be able to see some speciality or valuable variation in his animal; it may be small, but if desirable, then breed from that animal. It has been rightly said: "It is the small points of value that are gradually added together in different animals of the same *type* which constitute the sum total of perfection." It is these small points, which, having been detected by the keen observing stock-breeder and reproduced and increased generation after generation, that has given the world some of our most valuable stock.

To quote again, Darwin says: "I have been astonished when celebrated breeders have shown me their animals, which appeared all alike, and have assigned their reasons for mating this or that individual. The importance of this great principle of selection mainly lies in this power of selecting scarcely appreciable *differences*, which, nevertheless, are found to be transmissible, and can be accumulated until the result is made manifest to the eye of every beholder."

For the encouragement of the beginner, aiming at establishing and maintaining a pure bred flock, I mean for his encouragement after he has been working for a few years (like some of you already have), and you who see so little improvement, let me repeat Mr. Hellier's words when

speaking of stock-breeding. He says: "Nothing has been done at a jump, but little by little improvement added to improvement, and these fixed and perpetuated by judicious alliances of animals having in the main the same qualities, and whose variations from the original stock take the same line of direction." These few facts—somewhat dogmatically stated—I hope will awaken in those who need it a realisation of the almost immeasurable importance of heredity in stock-breeding, and how necessary it is to closely watch and study its powers and influences.

Again, there are, besides the direct influence of heredity, other forces, which the breeder needs to watch, and which can at times be turned to the very best account. One is the

"Surprise" or "Sport."

In how far "sport" is due to heredity has not been very clearly determined, but for all practical purposes this strange freak does not appear to be directly connected with heredity.

And it may be safely assumed, beside heredity, we have a less observable development through variation in the "sport" sometimes, but not often—in fact, very seldom—there is a sudden departure by an animal appearing quite unlike parents or ancestors in some important feature, either. For instance, one of these remarkable "sports" was the Otto sheep of America. "This breed originated—as all know—with one ram lamb, whose legs were exceedingly short, while its body was the usual size. By breeding from this one sheep and rigid selection, many thousands of these sheep were raised."

Influence of Sire and Dam.

In stock-breeding the sire and the dam both have a share of influence. It is not the sire alone or the dam alone. The lamb or kid must possess some of the characteristics of its father and some of the mother. Now since both parents are represented in the progeny, therefore the ancestors of both parents are represented. This important fact is apt to be overlooked by the amateur stock-breeder, and he often expects too much from the male. Science has taught us that the progeny are an admixture of the male and female, this makes it of the greatest moment that we study the female's qualities as well as the male's. It may be assumed with a great amount of safety that in the mating of the thoroughbred male and female, their progeny is a blending of both parents. But it must always be remembered this position is materially altered when animals of a mixed breed or of no particular breed at all are mated. Besides these facts of admixture of the qualities of both parents, there comes in another factor, which regulates the results of mating male and female—the greater power of the pure-bred. The pure-bred have a greater power of impressing their individual characteristics upon their progeny than the half-bred. This quality is especially the quality of pure-bred stock; the great force of their long descent tells on their progeny. It is found, as all of experience very well know, that when a male of great purity of blood is mated with low-bred females, his progeny bears much more the characteristics of the sire than when the same male is mated with pure females.

Cross-breeding is resorted to to start some new breed. Nevertheless, there is a vast amount of happy-go-lucky crossing of stock, producing large numbers of mongrels, with but few of the good qualities of either parent and most of the bad qualities of both.

Careful breeding results in great improvement in weight and uniformity of fleece, and it is only by adding small improvement to small improvement can the desired end be obtained. The improved qualities of fleeces added to the angora by man does not add to the comfort of the goat. The heavy long fleece does not make it enjoy life more, or better fit it for travelling in search of food, and it must be concluded, if left to itself, it would in a few generations lose those features which man has added for profit. Therefore the breeder needs to be unremitting in his watchful care to keep the breed up; sticking to pure blood is the only way to avoid trouble and disappointment.

And always remember Professor J. E. Duerden's helpful words: "That animals are now studied as so much living plastic matter capable of being moulded by environmental agencies." The breeder must make up his mind clearly and distinctly as to what are the most valuable points in his merinos or angoras which he proposes to improve. In doing this he has to consider constitution and build, coupled with the fleece of his stock, the grazing he has to give, the climate; then add to these things a well-trained eye, enabled to observe slight variations. When the beginner has fixed upon the ideal animal he believes his farm can support, he can closely examine the stock he has, and as a first step carefully classify them into first, second, and third flocks. Breed from the first, mating them with the best rams he has. Breed from the second, mating them with the second best rams, till the farm is stocked with the progeny of No. 1 flock; then sell No. 2 flock. Turn No. 3 flock into money as soon as possible.

In making the classifications, mark each class with a mark that will not disappear, and mark the progeny in the same way, and then you will always know at a glance which to sell or slaughter and which to keep and breed from. In establishing a stud flock of angoras it is wise to select from No. 1 flock a number and divide them into two or three families, keeping them separate, but under the same conditions as near as possible. By this means the system of "once in and twice out," or in-and-in-breeding can be carried on for a considerable time before it is necessary to "call a halt," and get new blood from other flocks, which getting we have seen is always connected with a certain amount of risk. The golden rule is, if you must go outside your own stock for new blood for your stud flock, always buy the new blood from one breeder; even if he only gives fair satisfaction, stick to that breeder. Continually changing the strain of the flock by buying from many breeders is disastrous for uniformity of type of fleece.

How to Select.

The beginner, or any stock-breeder, who purposes to adopt the system of in-breeding and believes he can do so by leaving all the examination of his animals till shearing time, and then with a scale weigh the fleece, and thereby decide which to breed from and which to reject, such a one adopting this as the only method of selection will only meet with disappointment, and far better keep right away from this system of in-breeding, because it is a method of improving stock which needs a very great deal of close and almost continuous observation It is a system that calls the breeder to study how he is best able to detect the animals that have weakness in their constitution, or in any of their internal organs. Some of the means to adopt to discover these defects may be mentioned, such as soon after the ewes are clipped be near them in the early morning. Watch those which voluntarily first leave shelter on a cold dry morning and go and feed; spot those that take two mouthfuls of food in the same amount of time as is generally taken for one mouthful, and, when drinking, put

the mouth well into the water and drink as though their very lives depended upon the job being got over, and, after drinking well, walk abruptly away and feed heartily or lie down and chew the cud. The ewes that are easily and quickly delivered of their young, with plenty of milk carried in a normal-sized udder; the ewes with plenty of width between the hind and fore legs, and whose toes turn neither in nor out, which walk with clean, bold steps and plenty of sparkle in the eyes, with no dropping of the top eyelid.

These are some of the signs of strong and sound constitution. Of course, there are many more signs besides, all of which give the observant stock-breeder a pretty correct clue to ascertain the most qualified individuals to select for the purpose of in-breeding; be sure to pick ewes and rams that keep in better condition than the rest of the flock.

These qualifications should be accompanied with at least a fairly profitable fleece, capable of improvement, and possessing at least the majority of the cardinal points needed in a good fleece. I have put constitution and build first and fleece second, because by in-breeding the fleece can be improved with certainty. If, on the other hand, constitution is sacrificed for fleece and weaklings are bred, there is then no hope of improving the constitution with the same certainty as in the case with the fleeces.

Conclusion.

Our country has vast tracts of grazing land, viz., similar to Spain, the home of the merino, and like Asia Minor, the home of the angora. Therefore we should be able to produce as good as the world can show in these stock, but the country wants more breeders practising intelligent stock-breeding and cultivation of steady perseverance on rational lines, studying carefully the laws governing our observation and our stock, sweeping away happy-go-lucky systems, having less of the speculating spirit and more careful stock farming.

I have to acknowledge the help of the writings of the late Mr. J. B. Hellier, and in conclusion can only add, if my humble efforts suggest any helpful new thoughts to at least some young beginner, or give him encouragement, I shall feel amply repaid, for then the feeling will come that I may have been successful in adding my mite towards assisting Rhodes University College in this good work of theirs.

PLASMOPARA IN ALGERIA.

COMPARISON OF ALGERIAN WITH CAPE CONDITIONS.

By C. P. Lounsbury, Government Entomologist.

The occurrence of the Plasmopara vine disease in Algeria and the recognised similarity of the rainfall in the viticultural sections of that country to that of the vine districts of our Western Province led, a few months ago, to the despatch of an enquiry to Mons. Roger Marés, the distinguished professor of agriculture in the Government College at Algiers and associate editor of the widely-read "Bulletin Agricole de l'Algérie," requesting information on the dependence or otherwise of the disease on rainfall and humidity as shown by Algerian experience. Professor Marés' reply was recently received, and a literal translation of it is as follows:—

I hasten to reply to the questions you have done me the honour to put to me with reference to the development of Mildew in Algeria. This disease, as well as Anthracnose, is spread throughout the colony, but it is more or less severe, according to the climatic conditions. At first one found Anthracnose and Peronospora in the same vineyards. But since we use for the sake of economy hydraulic lime mixed with sulphur for the control of oidium, and make repeated treatments with Bordeaux mixture, Anthracnose has totally disappeared from well kept vineyards, and only traces of it are found in badly kept ones, or in localities which are little subject to Mildew, and where one does not sulphate.

The Mildew invaded all the vineyards of the Algerian littoral (coast region) at the same time, about 1883, *notwithstanding that 800 kilometres (about 600 miles) of sea and a very severe import regulation which was preventing the introduction of all plants and even of fruits. From experience I consider, therefore, that measures of protection have no action whatever on the spread of Mildew, and we have recognised this fact so well that we have taken no measures against Black Rot,* from which we are always protected, because one cannot count on any other safeguard than the dryness of climate. After the invasion (by Mildew) *the vineyards of the littoral have every year furnished cuttings to the vineyards of the "tell," that is to say to the interior, and as you will see many of the latter do not suffer at all from Mildew.* All of the vineyards of the littoral, those in the fertile plains situated in the proximity of the sea, the plain of Bone, those of the Mitidja, the valleys of Djidjelli, of Bougie, the slopes of Dellys, Rouiba, Coléa, and Blida require to be sulphated five or six times. At Cherchell and Mostaganem, three or four times are needed. At Oran and Arzew once or twice suffices The influences which make the last two sections immune are perhaps several in number. The relative humidity is not high, rain is scarce, and the whole country is covered with salt lakes which get dry in summer, and where the winds are charged with saline dust. And I have observed that in the littoral bordering immediately on the sea the grape berries and the leaves are covered with a very thin layer of salt, of which one gets a taste with the tip of the tongue; and the vines here are less subject to the attack of Mildew than those which grow a few hundred yards back from the sea. But this is a special circumstance.

The winter rains have no influence on the development of Mildew. This is proved by Médéa and Tlemçen, which have as rainy a climate as Algiers and Chercel. Our summer rains equally have no influence, for they are storms following on the sirocco, the dry wind from the south, which has the property of arresting in one or two days the evolution of an invasion of Peronospora of full activity. The phenomenon

which is of chief importance as regards the development of Mildew is dryness of the atmosphere. Everywhere in fact where the humidity is feeble, that is to say, where the relative humidity goes below 60 per cent. during the months of May, June, July, and August, the Peronospora does not cause any damage. That is why at Tlemcen, Sidi-bel-Abbes, Orleansville, and Saida, sulphate is never used, the Peronospora never doing any harm. To summarise, the whole of the littoral, except close to the sea-shore, is subject to formidable invasions of Mildew, which one can only control by many sulphatings. *In the interior parts with a dry atmosphere, the disease practically causes no damage,* and if sometimes spraying is done, it is to prevent the slight invasions that occasionally appear in wet years, more often after a spell of close weather and of fogs than after rainstorms.

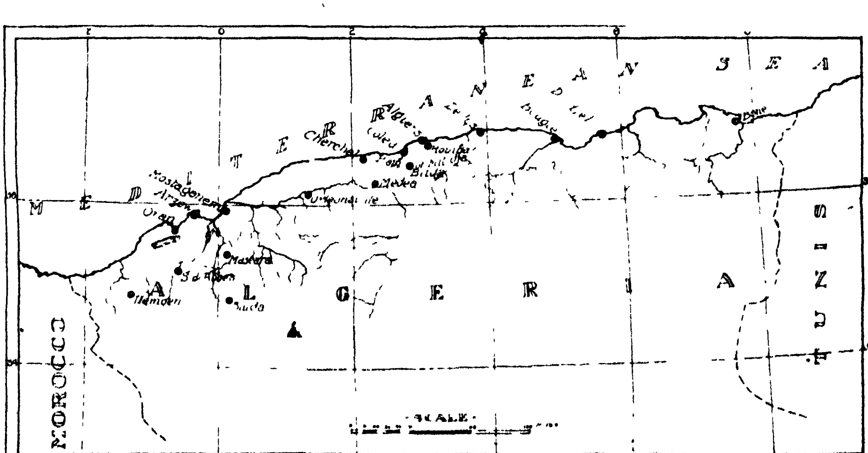
But the disease is everywhere. The proof of this is that one finds spots on the leaves everywhere in shaded gardens. But the destruction of the bunches of grapes (grappes) *only occurs in the littoral in vineyards not cared for.* Lastly, good care against Mildew gradually conquers Anthracnose.

I believe that *any measure of protection will have no other effect than of vexation to the vine growers.* It would be much more useful to give them very precise instructions on the damage which the disease may cause and upon the means for prevention. You will be able to deduce from the observations (meteorological) which I append, and from the facts which I have given, what consequences to expect in the Cape Colony.

(Signed) R. MARES.

Algiers, 12th October, 1907.

The words within brackets were inserted by the translator, and the use of italics to emphasise particular parts is also an addition. It should be observed that "mildew" and "Peronospora" are used interchangeably. They are the more common French terms for Plasmopara. What is called Anthracnose is what we know as black rust. The observations referred to by Professor Marés consist of two tables, both of which are here given in conjunction with Cape tables. One shows the average rainfall for each month of the year at eight towns in the Algerian littoral or coast region, and nine in the "tell" or interior region just back from the coast where vines are grown. The other shows the mean relative humidity for each month for the same places. The coastal towns are situated along the coast in the order in which they are given in the tables, Oran being situated near the western or Moroccan border and Bone near the eastern or Tunisan border. The distance between Oran and Bone is about 500 miles,



PREVENTION OF PLASMOPARA IN ALGERIA.

Places where five or six sprayings are required—Bone, Bougie, Djidlelli, Mitidja, Dellys, Rouiba, Koléa and Blida ; where three or four—Cherchel and Mostaganem ; where one or two—Oran and Arzew ; where none are necessary—Tlemcen, Sidi-del-Abbes, Orleansville, Médéa and Saida.

or more than the distance between Cape Town and Port Elizabeth. The inland places are in the western half of the country, and none more than about 75 miles from the coast in an air line.

The Algerian rainfall in Professor Marés' table is given in millimètres, and the altitudes in mètres; but to facilitate comparison with the Cape data the values are shown in inches and feet respectively in the table here given. For the same reason, the rainfall for each month in the case of Cape places is given in the same column as that for the corresponding month of the northern hemisphere, the Algerian January corresponding with the Cape July. The Algerian rainfall figures are monthly means of "all observations." Those for the Cape Colony are taken from Buchan's "Rainfall of South Africa," and refer to the period 1885 to 1894. Averages of later Cape records have not been published. The comparison shows little difference in the actual amount of precipitation during the summer months in the Algerian sections that suffer from Plasmopara and those that do not, and that the amount of the precipitation is not materially different to that of the vine sections of the Western Province. The striking difference between the rainfall of these western districts and the parts of the Eastern Province where the disease occurred last year, however, is well brought out.

The relative humidity table for Algeria shows more of interest. But, unfortunately, it is of little present use to us for comparison because of the almost total lack of similar data for the Cape Colony. Mr. Charles Stewart, the Secretary of the Cape Meteorological Commission, has been appealed to for information on the subject, and this paragraph is largely the result of a discussion with him. He has no work in his possession which shows how the mean relative humidity is computed in Algeria, but he thinks it probable that, as in France (the parent country of Algeria), the figure recorded for a month is the mean of three to six readings a day. Relative humidity is determined at a number of Cape places, but except at the Royal Observatory and at Kimberley once a day only, and that generally at 8.30 a.m. The readings at most places are made by volunteer observers, and in some cases at least are known not to be wholly trustworthy. But even those that are perfectly reliable are not closely comparable with records of daily means, since an 8.30 a.m. reading varies to an uncertain extent, often many per cent., from the mean. The highest relative humidity for the day usually occurs about 5 a.m. and the lowest between 2 and 3 p.m. It follows that an 8.30 a.m. reading is likely to be much above the mean. Then Cape observations in general are taken at 8.30 *standard time*, which in the Western Province is about three-quarters of an hour ahead of actual sun time, so that the relative humidity obtained tends still more towards the maximum for the day. A further difficulty is that no averages for the Cape have been published, and that the records for many places are incomplete. The Cape data given in the table were taken as far as possible from the last issued report of the Meteorological Commission, and refer to 1895. The places have been selected with a view to reliability. Data for representative eastern places were not given in the 1895 report, and in consequence the 1903 records were drawn upon, these being selected in preference to those for 1904, because they are the last in which details for Kimberley are included. Thanks to Mr. J. R. Sutton and the De Beers Company, more complete observations are made at Kimberley than elsewhere in South Africa, and it is only for Kimberley, of all places in the Colony, that we have a record of relative humidity based upon sufficient observations through the day to give an approximately true average. Hourly observations are there recorded, and to show how the humidity rapidly decreases as the morning advances, the figures for every second hour from 6 a.m. to 2 p.m. are reproduced It is understood that sun time is kept for the Kimberley instruments, so

that the 8 o'clock reading is really behind the 8.30 ones given for the Western Province, all of which are taken by standard time. The noon reading at the Royal Observatory, it may be here mentioned, is also taken by sun time.

These various factors which influence the value of the figures for Colonial places should all be borne in mind in making comparison with the Algerian figures, and even when comparing Eastern Province figures with Western Province ones. The sun reaches Grahamstown fully half an hour ahead of Cape Town, and Graaff-Reinet about twenty-five minutes ahead. The difference that half an hour may make in a reading may be deduced from the Kimberley data, and is also shown to some extent by the difference of the figures given for the Royal Observatory at 8.30 and the South African College at 9, these two places being only about four miles apart, and the College having the heavier rainfall. Further consideration in using the figures is necessary owing to local circumstances which might cause an early reading to be high. Thus the high reading at Elsenburg is owing to the mountain at the back keeping off the early sun. Probably this place and Groot Drakenstein have much the same relative humidity, despite the great disparity of the figures given in the table. It may be mentioned that the Groot Drakenstein records are kept by Mr. Lionel Baker at the farm Weltevreden, and that Mr. Baker is esteemed as one of the most reliable observers in charge of instruments for the Commission.

Altogether a fair comparison of the Algerian relative humidity tables with the available Cape data involves so much indefinite allowance that no very satisfactory conclusion can be drawn from it as regards the probable severity of Plasmopara when it reaches the Western Province. A study of the map of Algeria in connection with Professor Marés' statements, however, should somewhat alleviate apprehension. All the places which he names as being much troubled by the disease are on or close to the coast, including Oran and Arzew, where two sprayings only are necessary; and the places named where little or no spraying is done appear to be not over 75 miles from the coast, and all below the great plateau. Further comfort may be derived from the following description of the climate of the Algerian littoral or coast region where the disease does damage, for this description is hardly applicable to the Cape. It is taken from a report entitled "Agricultural Explorations in Algeria," published by the United States Department of Agriculture (Bulletin 80, Plant Industry):

"The climate of the littoral zone is much like that of the coast of Southern Europe; but fall-grown corps mature earlier than there, by reason of the milder winter and the higher temperatures in spring. . . . The relative humidity in the littoral zone is fairly uniform throughout the year. Owing to the proximiity of the sea, it is at all seasons considerable, the average for the year being 73 per cent. This condition of humidity is interrupted only when, generally in late summer and in early autumn, the siroco blows for a day or more at a time. The humidity is far greater in the eastern than in the western part of the colony. The large percentage of moisture in the atmosphere causes the discomfort from cold in winter, and from heat in summer, to be out of all proportion to the actual temperature. The dry season, so far as the littoral zone is concerned, owes its character to the lack of actual precipitation rather than to the absence of humidity in the air. Night fogs are frequent when east or north-east winds are blowing, and in August it is often 9 o'clock in the morning before they disappear. Dew is also copious at this season. Atmospheric humidity, like precipitation, decreases as one goes farther from the coast. It is already perceptibly less in the mountains and in the great valleys of the coast region than along the seaboard."

RAINFALL TABLES—ALGERIA AND CAPE COLONY.

ALGERIAN LITTORAL.

	Altitude	Jan.	Feb.	Mch.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	ft	in.	in.	in.	in.	in.	in	in.	in.	in.	in.	in.	in.	in.
Oran	137	3·10	2·68	2·69	1·60	1·14	·29	·08	·08	64	1 62	2 13	2·93	19·58
Arzew	66	3·64	3·52	1·82	1·91	·64	·41	·40	60	1 22	1·01	1·68	2·06	19·91
Mostaganem ..	265	2·63	2·71	2·42	1·60	1·12	·45	·12	·09	·81	2·29	3·08	3·20	20·52
Cherchel	66	3·24	3·08	3·66	2·22	1·61	·72	·02	·08	93	2·03	3·44	4·34	25·05
Algiers	128	4·43	3·74	3·47	2·40	1·42	·57	·06	28	1·13	3·06	4·44	5·57	30·57
Dellys	105	5·42	3·68	4·12	3 68	1·62	·75	·25	·36	1 53	4·25	5·13	5·12	35·68
Bougie	240	5·60	4·35	5·56	2·98	1·96	1·21	·49	48	1·76	5·12	5·52	6·41	41·44
Bone	115	4·57	3·15	3·48	2·49	1·12	·64	·23	80	1·09	2·96	4·13	4·75	29·41

ALGERIAN INTERIOR.

	ft.	in.	in.	in.	in	in.	in.	in.	in.	in	in	in	in	in.
Rouiba	92	4 74	3 53	4·60	2·20	2·24	·27	·03	·07	1·03	3·27	6·03	6·36	34·37
Kolea	530	3·61	3·15	4·38	2·46	1·24	·58	·30	05	98	2·83	3 60	4·94	28·12
Blida	790	5·53	3·87	4 97	4·34	2·45	·56	·20	·2	1·26	3·09	5 09	5 23	36·87
Orleansville ..	565	1·76	1·88	2 32	2·19	1·40	·56	·06	·08	·77	1·81	2 33	2 52	17·68
Sidi-del-Abbes ..	1,575	1·96	1·84	2·32	1 78	1·38	·51	·20	·28	·52	1·12	1·68	2 26	15·85
Mascara	1,810	2·06	2·67	3·47	2·45	1·61	·17	·06	·14	·77	1 84	2·65	2·99	22·08
Tlemcen	2,650	3·26	3·03	4·22	2·98	2·37	·81	·10	·14	·98	2·14	2 53	2·76	25·33
Médéa	3,000	3·60	2 83	4 18	4·09	2·05	·77	·22	·16	·81	3·10	3·48	4·59	30·18
Saida	2,900	1·97	1·95	1·93	2·31	1·90	·54	·23	·20	·98	·82	1·44	2·52	16 79

WESTERN PROVINCE, CAPE COLONY.

	Altitude	July	Aug.	Sept.	Oct.	Nov.	Dec	Jan.	Feb.	Mch.	Apr.	May	June	Total
	ft.	in.	in.	in.	in.	in.	in	in.	in.	in	in	in	in,	in.
Groot Constantia ..	200	7·10	5·85	3·80	2 55	1 35	1·51	·48	·65	1·02	3·92	7 20	7 02	42·45
Royal Observatory.	40	4·04	4·09	2·38	1·68	1·02	1·00	·41	·74	1·06	2·37	4 72	4·44	27·95
Somerset West ..	100	2·71	3·41	2·25	2·22	·79	·49	·29	63	·66	1·76	3·57	4·41	23·13
Klapmuts ..	555	3·70	4·22	2·83	2·16	1·23	·82	·45	·57	1·08	2·58	4 71	5·14	29·49
Malmesbury ..	460	2·15	2·62	2·02	1·20	·87	·48	·18	·59	·64	1·72	2·83	3·16	18·46
Wellington ..	400	2·92	3·47	2·40	1·90	·87	·63	·47	·78	·73	2 41	4·15	4·83	25·58
Ceres	1,493	4·55	5 61	4·74	3·02	1·59	1·24	·52	·69	1·05	2·82	7 98	7 81	41 65
Tulbagh	490	1·85	2·55	2·36	1·62	·87	·75	·22	·75	·60	1·68	2 86	2·75	18·66
Worcester ..	780	1·11	1·65	1·37	·89	·53	·68	·10	·42	·57	·96	1 37	1 98	11·69
Robertson ..	600	1·29	1·22	1·44	1·25	·87	·88	·37	·83	·92	1·10	1·36	1·50	13·03
Caledon	760	2·04	2·53	1·93	1·81	1·39	·91	·81	·70	1·39	2·09	2·74	2·40	20·44
Montagu	727	1·56	1·65	1·22	·96	·84	·32	·19	·65	·57	·83	1·14	1·20	12·13
Oudtshoorn ..	1,090	·58	·96	1·19	·79	·81	·65	·53	·74	1·19	1·02	1·43	·53	10·42

EASTERN PROVINCE, CAPE COLONY.

	ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Grahamstown ..	1,800	1·59	1·54	2·90	2·76	4·01	2·98	2·71	2·59	3·07	2·53	2·16	·88	29·72
Fort Beaufort ..	1,500	1·18	·98	2·09	2·18	3·33	2·22	3·18	3·00	3·79	2·46	1 19	·42	25·97
Balfour	2,103	1·21	1·25	1 81	2·73	3·12	3·47	3·53	2·95	4·00	2·23	1·12	·64	28·06
King William's Tn.	1,314	1·16	1·47	2·61	2·17	3·77	2·82	2·69	2·93	2·71	2·58	1 79	·77	27·47
Graaff-Reinet ..	2,500	·87	·54	1·59	1·65	2·05	1·93	2·03	1·90	3·06	1·32	1·47	·35	18·76

RELATIVE HUMIDITY.—ALGERIA AND CAPE COLONY.

ALGERIAN LITTORAL.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept	Oct.	Nov.	Dec.
	%	%	%	%	%	%	%	%	%	%	%	%
Oran	74·8	73·3	72·2	61·2	68·3	65·1	69·6	72·2	72·8	71·8	73·1	75·9
Arzew..	77·8	80·0	79·8	77·0	70·0	68·4	66·8	68·1	70·0	68·5	80·0	75·7
Mostaganem	80·0	77·1	75·7	78·1	76·3	74·4	71·8	75·6	80·5	80·1	79·6	77·2
Cherchell	81·6	83·8	83·6	80·0	78·3	77·5	77·5	78·3	80·5	75·3	79·5	80·6
Algiers	69·9	70·0	69·5	67·1	69·1	70·5	70·9	72·3	72·8	69·7	69·8	70·5
Dellys..	83·6	85·1	80·1	82·0	75·4	76·6	78·5	69·5	80·0	78·7	76·7	79·8
Bougie	68·9	66·6	67·6	65·5	66·1	67·7	69·3	65·9	68·7	65·5	63·9	67·5
Bone	81·9	81·5	74·5	73·4	71·6	70·9	70·4	71·4	72·8	73·3	75·2	78·7

ALGERIAN INTERIOR.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept	Oct.	Nov.	Dec.
Rouiba	82·8	80·5	79·1	81·2	82·1	73·1	70·1	70·2	78·4	78·1	75·8	81·8
Koléa	85·3	83·7	84·9	80·5	79·6	77·1	74·8	77·6	80·3	81·5	82·1	83·6
Blida	85·3	87·8	84·9	83·1	79·4	75·1	76·3	76·1	83·6	85·4	84·2	86·3
Orleansville	79·5	77·2	73·4	71·0	61·5	54·8	54·3	52·2	56·9	69·0	75·1	81·5
Sidi-del-Abbes	74·0	73·4	73·6	69·0	66·9	57·1	51·9	52·0	59·0	68·1	72·2	76·4
Mascara	75·8	75·3	76·6	77·5	74·5	72·7	66·5	64·6	71·8	75·2	76·7	77·1
Tlemcen	61·4	62·7	63·1	61·5	59·6	53·4	49·2	46·9	55·2	63·3	63·7	64·4
Medea..	76·2	73·6	70·6	70·9	62·5	53·1	42·9	41·7	55·9	67·6	71·0	75·7
Saida	72·1	68·7	67·3	59·2	57·8	46·8	39·5	40·6	51·9	63·6	66·5	73·0

CAPE COLONY.

	July.	August	Sept	Oct.	Nov.	Dec	Jan.	Feb.	March.	April.	May.	June.
	%	%	%	%	%	%	%	%	%	%	%	%
Royal Observatory, 1905, 8.30 a.m.	81·0	81·0	83·0	84·0	69·0	65·0	74·0	71·0	76·0	84·0	91·0	87·0
Royal Observatory, 1905, Noon	68·0	63·0	63·0	63·0	59·0	54·0	62·0	59·0	56·0	59·0	70·0	71·0
Groot Constantia, 1905, 8.30 a.m.	75·0	78·0	76·0	75·0	65·0	68·0	66·0	65·0	68·0	76·0	81·0	81·0
S. A College, Cape Town, 1905, 9 a.m	73·0	77·0	79·0	73·0	62·0	70·0	60·0	63·0	63·0	76·0	85·0	83·0
Elsenberg, 1905, 8.30 a.m ..	85·0	88·0	87·0	81·0	73·0	75·0	80·0	78·0	68·0	87·0	91·0	92·0
Groot Drakenstein, 1905, 8.30 a.m.	77·0	78·0	70·0	66·0	57·0	55·0	58·0	57·0	62·0	72·0	86·0	85·0
Robertson, 1905, 8.30 a.m. ..	86·0	86·0	84·0	76·0	67·0	58·0	63·0	73·0	76·0	86·0	87·0	85·0
Graaff-Reinet, 1903, 8.30 a.m.	64·0	78·0	62·0	72·0	71·0	68·0	63·0	75·0	61·0	70·0	74·0	76·0
Grahamstown, 1903, 8.30 a.m.	85.0	87·0	76·0	65·0	79·0	72·0	82·0	84·0	87·0	88·0	84·0	78·0
Kimberley, 1903, 6 a.m. ..	66·8	65·2	58·6	57·4	57·2	61·3	62·4	76·2	64·5	82·3	79·1	73·0
Kimberley, 1903, 8 a.m. ..	65·1	59·7	44·2	41.6	39·6	44.7	43·6	60·6	50·3	68·3	71·3	68·1
Kimberley, 1903, 10 a.m. ..	47·2	41·8	33·7	34·0	31·4	34·3	34·1	45·0	35·8	48·7	50·3	48·4
Kimberley, 1903, Noon ..	38·3	33·4	26·7	28·3	27·7	27·1	27·5	35·4	20·2	40·3	41·0	40·1
Kimberley, 1903, 2 p.m. ..	32·7	29·6	23·8	25·0	26·2	26·4	24·9	30·2	27·2	36·7	35.4	35·1

THE BEE INDUSTRY

NOTES ON THE REPORT OF THE SELECT COMMITTEE ON THE BEE INDUSTRY OF CAPE OF GOOD HOPE.

By Frederick Sworder.

Quite recently the printed report of the Select Committee on the Bee Industry of Cape of Good Hope, dated August, 1907, has been placed in my hands. It was ordered by the House of Assembly that a Select Committee be appointed to investigate and report upon the Bee Industry and Honey and Wax Production in this Colony, with a view to ascertaining how and in what manner the same could best be encouraged and developed; the Committee to have power to take evidence and call for papers, and to consist of Messrs. Blaine, Oosthuizen, Dr. Vanes, Dr. Viljoen, the Secretary for Agriculture, and Mr. Michau.

Then follows the evidence taken, and the suggestions recommended by the Committee, having for its object the furthering of the Bee Industry in the Cape Colony.

Mr. P. J. Hannon's evidence dealing with the measures adopted in Ireland, by endeavouring to create an interest among the peasant farmers, is very complete, while he evinces an earnest desire that steps should at once be taken to organise some system to promote this already too neglected, yet profitable industry in the Colony.

Regarding the importation of bees from foreign countries for the purpose of improving the race indigenous to this country, with the liability of introducing that terrible disease known as "Foul Brood," I am quite of his opinion.

This dread curse may be capable of development in districts near the coast, but so far, in the Transvaal, even in hives which I have found exceptionally dirty and where I naturally expected to find it, no trace has yet been met with, neither do I, on account of our dry climate, anticipate any cause for alarm on this point. It is my candid opinion that its development amongst our bees is almost impossible.

Most of the books published by the best authors in Europe and America devote a chapter to this particular subject, and this matter is read and pondered over by purchasers of these works in this country. Their readers may dismiss from their minds all liability of their occurrence. This fact should be of great consolation to those already keeping bees, besides those who contemplate making a start in the industry.

The experience of this witness on transferring swarms or stocks from their so-called wild state into frame hives is unfortunately very limited. But on further reading I quite agree with him that our present South

African bee, *i.e.*, the bee marked with the three yellow bands across the upper part of the body, with two delicate white bands near the tip of the tail, is eminently suitable. Having examined some thousands of stocks of this particular race of bee, I claim to be in a position to state without hesitation that this much despised South African bee when properly dealt with can be handled by almost anyone. Where care can be or has been taken through selection to improve its disposition and all-round working qualities, I am convinced that the importation of bees from foreign countries with the idea of improvement can best be left alone. If the specimens of honey passing through my hands are any criterion as to the capabilities of our South African bee, then I emphatically assert that with proper management we possess a very energetic race of bee, and in good districts one capable of producing excellent honey in large quantities.

The evidence of Mr. J. F. Badenhorst, a long resident of Riversdale, reveals a lamentable want of knowledge on the part of the farmers in that district, and what is of importance, they are blessed with an excellent honey flow, with an abundance of natural swarms.

Apparently also large quantities of honey are secured, but on further reading, what a terrible disclosure to a practical beekeeper, when he learns that it is actually stated that this so-called honey which is offered for sale is mixed with brood. No wonder that this unpalatable rubbish fetches only 3d. per lb.

To one who has studied the anatomy of the bee, Mr. Blaine's question, No. 110—"Is it much more difficult for the bees to get the wax than the honey?"—appears very amusing. Does Mr. Blaine infer from this that bees collect wax as well as honey? If so, he should be made aware of the fact that wax is not collected, but is produced by close clustering in the body of the bee, through the consumption of honey.

Mr G. E. Jeffries should be informed that section honey if maintained at a temperature not below 65 degrees Fahr. will not granulate, and can be kept for almost any reasonable period. When honey granulates it is the surest proof that it has not been adulterated.

Mr. Michau appears to possess no very clear idea of the difference between frames and sections (see question 151). He also makes a grievous error by calling bar frame hives patent hives. There is to my knowledge no such thing as a patent hive. Although patents have been applied for in connection with hive fittings, the principle of frames hanging in a box or hive was the invention of Mr. Langstroth, an American, in 1851. This incorrect term is too often used in this country to describe the bar frame hive, and the sooner it is dropped the less confusion there will be. All beekeepers are always strongly urged not to use patent hives.

The evidence of Mr. Louw, as far as it goes, is sound, but his manner of fixing super-foundation into the sections is not quite up to date. Has he never heard of or seen the split top section, by the use of which this foundation is very easily, quickly, and securely fastened as the section is being folded in a square block provided for the purpose?

In all probability the evidence of the gentleman who is mentioned as residing at Stellenbosch would have been of considerable benefit, and why was not Mr. F. Shaw examined, seeing that he is the Secretary of the Beekeepers' Association in the Cape Colony? It would be gratifying to know that this association is doing some substantial good. To sum up the report, my opinion is that in Cape Colony, possessing its good districts for the production of honey, there is unfortunately and unquestionably a lamentable want of knowledge amongst the struggling beekeepers, who are sadly groping in the dark.

The sooner steps are taken by the Colony in appointing competent instructors to impart sound knowledge and teach them how to keep bees on up-to-date principles, working on economical lines, and instilling into them the importance of placing their honey on the market in the best possible form, the better it will be, not only for that Colony, but for the whole of South Africa.

One of the chief difficulties met with, and which I am convinced will gradually be overcome, is an ingrained prejudice amongst the farmers.

Delusions, superstition, and mistaken ideas have been handed down through succeeding generations, and if beekeeping is to be made a success, the time has arrived when these fallacies must be eradicated.

It is stated in evidence that the farmers assert that they know more about the bees in their respective districts than a practical beekeeper, who has made almost a lifelong study of these interesting insects.

In reading between the lines of this report I have purposely omitted many points, while criticism could be heaped up, but have thought it best to forbear, where an important industry of this nature is in its initial stages and needs every encouragement.

PRESENT NEEDS OF THE OSTRICH IN SOUTH AFRICA.*

By Professor J. E. Duerden, M.Sc., Ph.D., A.R.C.S.

South Africa is noteworthy in having two important industries which minister to the decorative and ornamental needs of mankind, namely, the diamond and the ostrich feather industries. In neither case are the products such as are necessary or even contributory to the actual welfare of man, yet they supply one of the instincts everywhere manifest in human beings, namely, the love of display and decoration. As industries both may be said to be on an assured and permanent basis, in quantity produced easily to outrank all other countries, and to be almost wholly export in nature and very lucrative. At present the export value of ostrich feathers is nearly £1,500,000, and the number of birds and value of the feathers exported are increasing with rapid strides.

The ostrich industry is of only about forty years' growth, and, as a branch of farming, has yet many of the elements of newness and inexperience; many problems still call for investigation before a complete knowledge of the best methods of management of the birds will be evolved. Only a single treatise, that of the late Hon. A. Douglass, on "Ostrich Farming in South Africa," has yet appeared dealing with the industry on a practical basis. Though published twenty-six years ago, the book contains many facts scarcely appreciated by the farmer of the present day, but makes no pretence to completeness or scientific merit. The object of the following remarks is to draw attention to some of the present needs of the ostrich as a domesticated animal, mainly as viewed from the zoological standpoint or that of the animal itself. Until many more researches have been conducted it must suffice merely to point out the problems calling for solution. It will be long before our knowledge of the ostrich has reached the stage occupied by that of the longer domesticated animals, such as the horse, ox, and sheep, upon the treatment and management of which numerous works are available.

The Ostrich as a Domesticated Animal.

As already remarked, it is only about forty years since the first ostriches were brought under domestication, and the degree to which this change from natural to artificial surroundings is carried out is even yet becoming more and more pronounced. At first the birds were kept in large enclosures, which gave such freedom of range and variety of conditions as differed but little from those of their natural state. But with the introduction of lucerne feeding and chick incubation a much higher stage of domestication was reached; and now crowds of birds are maintained in comparatively small camps and fed in a highly artificial manner.

* A paper submitted to the Intercolonial Agricultural Union at Pretoria.

It is manifest that these new conditions must exert a strong influence upon the nature of the bird, and there are some who view the change with alarm, as possibly leading to a deterioration of the ostrich. It does not appear to the writer, however, that there is much cause for this alarm, assuming that the altered circumstances are fully realised and action is taken accordingly. All the domestic animals employed by man—the horse, ox, sheep, goat, pig, fowl, duck—were originally wild, but probably no one would contend that these have not improved greatly as a result of the care and attention afforded them— at any rate, in the directions along which they are useful to man. It is true that much care has been necessary in adapting the animals to their changed conditions, particularly as regards feeding and the treatment of diseases, some of which diseases have no doubt been aggravated by the crowded conditions of domesticated existence.

The domestication of the ostrich, resulting in a general change of habits and feeding, in crowding and freedom from enemies, demands that full recognition should be taken of these facts, and for some time ostrich farming will have to be carried out somewhat as a new problem in adaptation, and demand more care than the farming of stock generally. The conditions best suited for the change will need to be carefully studied and a general system of treatment elaborated. As a result of accumulated experience farmers are beginning to understand more and more these necessary conditions, but there is yet much diversity of opinion upon important details of management, and many partial failures where there should be success. Still, where the conditions are understood there is much encouragement to the farmer, and, as regards the sole need for which the bird is kept, namely, feather production, great advances are being made over the wild bird. The industry is with us to stay, and its successful prosecution is worthy of all the best effort which science and practice can put forth.

I therefore state it as one of the vital problems of the subject: how best to adapt an originally wild creature to the greatly altered conditions of domestication, and how best to attain the possibilities of improvement of the animal under these conditions.

Management of Birds, Clipping and Quilling.

In the actual management of both chick and adult ostrich there is much yet to be learnt, looking upon the bird as a feather-producing organism. The enormous development of lucerne-growing under irrigation has greatly simplified the problem of feeding, for probably no better food than lucerne could be obtained. The ostrich, however, appears to thrive best on varied and regular changes of food, and a combination of lucerne pasture and veld seems most desirable, often supplemented by bones, salt, and other constituents necessary to make up a proper food ratio.

One problem calling for study is that of the great influence upon the bird and its feathers of a change of conditions, whether of food as a whole or of locality. Many a clipping of feathers has been spoilt by suddenly changing the food, and almost invariably a bird falls off in condition when moved from one district to another. In the management of ostriches great constancy or uniformity of conditions seems to be called for, and, if a change must be made, it should be brought about as gradually as possible. Once a bird gets into low condition it is well understood how difficult it is to get it into full vigour again, and a knowledge of the best foods and treatment for this purpose is very desirable. The question of the housing of birds during inclement weather will call for attention in the future.

There is still much diversity of opinion and practice as regards the times of clipping and quilling the feathers, especially noticeable in passing from one district to another. In some districts where food is plentiful and climatic conditions fairly uniform all the year it is possible to secure a clipping every eight or nine months, while in districts with cold winters and more dependence upon seasonal rains a clipping is looked for every twelve months. It is manifest there will be much difference in the financial returns according as the farmer secures three clippings in two years, four in three years, or only one each year. It is contended by some that clipping oftener than once a year weakens the subsequent feathers by the unnatural amount of growth at unseasonable times, yet others again find that it is impossible to restrain the growth for a one-year crop. These are all points calling for consideration, and involve a study of the conditions which accelerate and the conditions which retard feather growth, as the farmer has a certain control over these. It is worthy of note that in the United States and New Zealand a crop is obtained every eight months.

At the present time the influence of castration on the bird is exercising the minds of many ostrich farmers.

Hatching, Rearing, and Management of Chicks.

The artificial hatching of chicks in incubators has to a large degree replaced the natural method of parental incubation, and as regards the success with which it is carried out leaves little to be desired. It is not at all unusual for ninety or ninety-five per cent. of the chicks to hatch, probably as great a percentage as under natural conditions. By thus taking away either wholly or in part the duty of six weeks' nesting a considerable proportion of the bird's time is saved, and is available for the further production of eggs. In this way it becomes possible to secure three or even four nests of eggs during the breeding season, a great consideration in the case of eggs from superior pairs.

Where incubation is properly carried out the chicks secured are probably just as strong and healthy as those hatched by the parents, but it has become a matter of much consideration with farmers as to how far the forced egg-laying acts detrimentally both upon the laying hen and the progeny. As regards the increased egg production no evil results to the hen seem to follow, and would scarcely be expected, considering how much egg production can be increased in other birds under domestication. But it seems to be admitted by all that the chicks hatched from late season eggs are by no means so vigorous and healthy as those hatched during the more normal part of the season, and do not make the same progress subsequently. This is a matter which as the industry progresses will have to be taken into careful consideration.

The rearing and management of chicks is a subject of the greatest concern to the ostrich farmer; probably at no stage are his results so uncertain or as likely to be disappointing. Frequently large broods of chicks will be hatched, and the farmer sees them dwndle away one by one, often powerless to prevent. Though in some seasons and localities chick mortality is worse than in others, still the trouble is very general, but the South African ostrich farmer may take some little consolation to himself by the reflection that the same difficulty exists in as great, if not greater degree, in the rapidly-developing ostrich industry in the United States, for even there frequently not more than five or six chicks will be reared in one season from a single pair of birds. Though artificial chick-rearing at times seems so discouraging, it is a great numerical advance upon the natural conditions, where the actual increase must be very

small; but in nature we have the destruction from many enemies to take into account, enemies from which domesticated chicks are free.

No thorough investigations have yet been conducted into the question of the excessive mortality among chicks, and as to the best conditions under which they should be reared. The influence of the wire-worm and the nature of the "so-called yellow-liver" in chicks call for study. There is no doubt that much can be achieved by attention to warmth, dryness, infected or uninfected ground, and the character and variety of the food.

Diseases and Parasites.

Like most animals, domestic and wild, the ostrich is subject to a number of diseases and to infection from several forms of internal and external parasites, particularly when young. Even if not fatal, many of these reduce the birds to such a degree that the feather production suffers greatly, and recovery is often very slow. In contrast to this susceptibility to parasites, it must be admitted that the ostrich possesses a remarkable power of recovery from injuries; he recovers from skin and flesh wounds and surgical operations in an astonishing manner; moreover, once he has got over the pitfalls of youth diseases give but little trouble.

The wire-worm (*Strongylus Douglassi*), infesting the mucous membrane of the upper wall of the stomach, is unquestionably the greatest trouble of the ostrich farmer. Even where the birds are not decimated by it, they are often reduced to such a low condition that their feathers are almost valueless. It seems to be one of the principal causes of mortality among chicks, though the actual proof of this calls for more thorough investigation. Some farmers hold that no birds are altogether free from the parasite, and that it is only kept in check by maintaining the birds in excellent nutritive condition.

From the region at which the wire-worm infests the stomach and its strong power of resistance to the usual remedies, its destruction is particularly difficult The Agricultural Department has already conducted many tests as to the best remedy against wire-worm, and the drastic carbolic acid treatment has been found satisfactory by many farmers. Some birds, however, require a year or two in which to completely recover from the attack, and entail much loss by the inferior quality of feather produced during the period. Experiments upon the life-history of the *Strongylus* are much needed, and, if the method of infection were known, this would probably be of some assistance in combating the trouble.

The tape-worm, also very prevalent, does not appear to have a particularly harmful effect so long as the bird has plenty of good food. Moreover, it is easily kept in check by the regular dosing of the young birds with turpentine and other remedies, such as is carried out by many farmers.

In dissecting adult birds another worm is sometimes met with entwined in the mesentery and connective tissues outside the organs. Numbers of these of different sizes are found grouped together, some a foot or two in length and others only two or three inches. It is evidently an undescribed species of Nematode, and at an earlier stage occurs in large numbers in the intestine.

Yellow-liver in chicks will probably be found to be due to the presence of some protozoan parasite, and researches in this direction are urgently needed.

A form of lamziekte is becoming somewhat prevalent in certain localities, and is under investigation.

Among external parasites much consideration has been given to the ostrich mite, *Pterolichus bicaudatus*, nearly always found along the inner

groove of the shaft of the feather. Formerly much significance was attached to this parasite as a possible cause of the production of defects in feathers, but it is now shown to have probably little direct effect upon the bird or the feather. The parasite lives upon the dried pith or medulla of the feather from which the nutritive blood has receded, and thus confines itself to a part which is useless, and preened away as the plumes attain maturity. Perfect feathers are as likely to be infested with the mite as are very defective examples.

The ostrich louse and fly, though somewhat troublesome at times, do not seem to demand serious consideration. The wire-worm, tape-worm, and probable protozoan parasite of yellow-liver are the ostrich pests most calling for study.

Investigations are showing that for perfect feather production the birds must be kept in as perfect a condition of health as possible, and experiments are now in progress as to the best foods and treatment for maintaining such a desirable condition. Though the digestive powers of the ostrich are proverbial, the bird under domestic conditions is by no means free from digestive troubles, and especially during a state of drought a knowledge of the best food is desirable.

Defects in Feathers.

Comparatively few ostrich feathers as clipped from the bird are altogether perfect, and hence command a much less price than would otherwise be the case, even though the defects can for the most part be remedied in the dressing of the feather. Frequently feathers are thin and narrow where they should be full and broad, this usually resulting from a lowered nutritive condition of the bird. The defects of greatest concern to the farmer are those technically known as "bars," and represent an imperfect formation of the plumes at more or less regular intervals. From the presence of these bars a clipping will frequently be worth from 25 to 50 per cent. less than if they were absent, a loss which represents many thousands of pounds annually to the farmer. The matter is one which has long called for investigation, and the writer has for some time been carrying out researches upon the subject on behalf of the Government of Cape Colony.

Similar defects are known to occur in practically all birds, though probably in none to the same degree as in the ostrich; moreover, bars are found in the plumes of the wild ostrich, as well as in those of the domesticated bird, and among the latter some are much more subject to them than others. Various explanations as to the cause of bars have been suggested, but when put to experimental test none is found to be at all adequate. An obvious explanation would be that they represent an impaired nutritive condition of the bird, hence the term "poverty bars" sometimes employed, and the first experiments were directed to prove or disprove this. It has now been shown that the defects are almost as likely to occur in birds highly fed as in those with enfeebled constitution; different strains vary much in the degree to which barring prevails. In some instances they have been proved to be produced by exposure to inclement weather by constriction of the lip of the socket around the soft growing feather, but this is undoubtedly only an exceptional occurrence, and does not strike at the root of the matter.

The experiments and observations have proceeded so far that one can now safely say where the trouble lies and how the bars are produced, and at present others are being conducted with a view to determining a remedy.

Feather Improvement.

Probably no subject is at present occupying the minds of ostrich farmers so much as that of improvement in the quality of feather produced. A wave of enthusiasm is passing over Cape Colony, having as its object the development of the ostrich to its utmost possibilities. The extraordinary high prices offered for superior feathers (£50 to £60 per pound), as compared with those of average character, is a stimulus which is acting most beneficially upon the industry. No amount of money is considered too high for birds of good pedigree producing feathers of a superior type; hundreds of pounds are freely given for breeding pairs known to produce chicks of superior type, and the supply is unequal to the demand.

In a more limited degree the tendency towards superior feather production has now been maintained for such a number of years that one is justified in attempting to estimate its results and consider its possibilities. Undoubtedly there is among the more progressive farmers a much higher average in the quality of the feathers offered than formerly; almost everywhere one sees the introduction and breeding of superior birds taking place, and the elimination and repression in breeding of the less worthy, with the result of a marked improvement in the character of the flock. Breeders of improved strains reap a rich harvest from the sale of chicks alone. In view of all this activity it may reasonably be asked whether the amount of selective breeding in progress has improved the actual quality of feather capable of being grown. Everyone is agreed that the average quality is rising, but are any feathers being produced superior to those obtainable years ago, and even yet to be obtained from the wild bird. There appears to be a general consensus of opinion that not much advance, if any, is being made upon the best types of feather formerly procurable. The best breeders and feather growers, like Evans, Barber, the Kingwells, Whites, and Meirings, are apparently not improving much upon their original birds, and superior strains do not seem to be forthcoming elsewhere.

If the above conclusion be admitted, the situation calls for careful analysis in its bearing on the future of the industry. For while one must take deep satisfaction in the general improvement in the average of feather production, it is far more stimulating to the scientific progressive farmer to contemplate the possibility of further advance as a result of his special endeavours. Even though certain superior strains have been recognised for ten or fifteen years, and selective breeding among these carried on to a large extent, yet it must be admitted that this is a very short period in which to expect great advances, seeing the long time between one generation and the next (about four years), and the small degree in which the principles of breeding are understood. Now that much more attention is being devoted to the subject there is great hope in the future, and the Stud Book will undoubtedly assist by stimulating a healthy rivalry and recording advances.

In the breeding of animals two possible methods of improvement are recognised: first, the method of selective breeding, and, second, the appearance of mutations.

The fundamental principles of breeding are well established, even though all farmers may not be conversant with them. They are based upon the principles of heredity. It is clearly recognised that there are congenital differences in the individual characters in animals of the same stock, and this whether the characters are desirable or undesirable; and, further, it is known that these differences are likely to be transmitted to the offspring, or, as familiarly stated, like produces like. The differences represent tendencies in definite directions inherent in the individual, and, on the principle of heredity, these are likely to appear in the progeny. The

likelihood of any desired tendency being transmitted is all the greater if, in mating, two individuals with the same characteristics are chosen. Not only is the desired character likely to be transmitted by mating like with like, but there is much probability of its being accentuated or increased. The production of a third or mean character so often desired, and attempted to be gained by the mating of two extremes or divergent types, is less certain. In mating forms with similar characters or tendencies we are likely to fix or accentuate a pure type, while in mating with different characters a rearrangement of germinal potentialities is demanded, and we are less confident of the results. It is by the carrying out of these principles that all the great improvements in domestic animals have been brought about, and the ostrich farmer should attempt to follow the same.

The results so far from selective breeding seem to indicate there is a fair degree of purity among the different strains of ostriches, that is, one can rely to a certain extent upon the progeny having the desired characteristics of the parent.

This question of purity of type, by which is meant that the offspring will resemble the parent, is one which is exercising greatly the minds of the most progressive farmers. Several well-marked types of feathers are to be recognised, and one of the influences of the Stud Book should be to encourage these various types and develop them to their utmost, each along its own peculiar line. As yet it must be confessed that opinion is somewhat divergent as to the most advantageous types to breed, advantageous to the farmer, the feather-buyer, or for show purposes, and there is some danger of combinations being attempted which may prove detrimental. The safe course for a farmer to pursue is to mate his best examples, like with like; he can then expect with a fair measure of assurance that the offspring will at least have all the good qualities of the parents, and also hope for an accentuation of these. The much-disputed question of in-breeding needs to be considered in this connection.

As regards the requirements to be sought for from selective breeding in the ostrich, the problem is fairly simple, compared with the same problem in many other domesticated animals. In horses, cattle, sheep, etc., combinations of characteristics have to be considered by the breeder in estimating the desirability of any particular parent. The only ultimate object aimed at in the ostrich is quality of feather; bodily constitution, shapeliness, and other characters will no doubt ultimately have to be taken into account, but no attention has yet been given to any other factor than that of feathers. Considered in detail, however, there are a large number of variable qualities even as concerns feathers, and one rarely finds a bird equally superior in all varieties of feathers—whites, blacks, tails, etc.

The aim for purity of type in the ostrich is much to be encouraged, and granted that one has a superior type to begin with, there is every reason to expect from results with other animals that the continual selection from the best of the progeny will gradually yield a higher grade of feather. With the three or four years between one generation and another progress will undoubtedly be slow, but none the less sure.

Mutation.—The second possible method by which feather improvement may take place is that known to zoologists as Mutation. It differs wholly from the first method in the suddenness and uncertainty of its appearance. By mutation is meant the sudden appearance of a new character in an individual, not a character which is transient or fluctuating, but one which will be transmitted to the offspring. To a large extent it means the production of what is known among horticulturists as "sports," and is the method by which many new plants and types of animals have been formed. It is much more likely to occur among some animals and plants than among others, and has at times been a very valuable means of introducing new breeds. It must be admitted that the ostrich does not

show many indications of "striking out," as it were, in new directions as regards its feathers, but among the hundreds of thousands of ostriches now living in South Africa it seems not unlikely that at times valuable sports may occur. This is all the more probable seeing that the bird is now under changed conditions compared with formerly, for it is found that new characters are more likely to occur under altered circumstances. Imagine the fortune that would accrue to the farmer who some day should discover that a bird was giving a feather double the usual density, or double the usual width or length. Similar instances have occurred in other animals, and there is no reason why such should not happen among ostriches, even though it must be admitted that the ostrich is a very ancient animal, with its characteristics well fixed; only the other day we had a three-toed ostrich chick, and odd specimens with an extreme silkiness of feather have lately appeared. I advance the method of mutation here in the hope that farmers will keep a careful watch for the appearance of new types, and be ready to appreciate them, and produce therefrom a superior variety, from which they may reap enormous advantages themselves, as well as confer a boon on the industry.

Summary.

1. It is shown that the ostrich is a recently domesticated animal, and that much study will be necessary in working out the best treatment for it under the changed conditions and the possibilities of its improvement; such adaptations and improvements have occurred among other domesticated animals.

2. The hatching of chicks by artificial incubation, in whole or part, is very successful, but the influence of forced egg production on the progeny calls for careful consideration.

3. Everywhere the mortality among chicks up to about six months is very excessive, and there is great need for investigations upon the best methods of rearing and managing chicks.

4. More knowledge of the conditions under which birds can be moved from one locality to another, and of the proper combinations of foods and treatment, especially during droughts and when in low condition, is desirable.

5. Fuller researches into the life-history and treatment of the wire-worm, tape-worm, and nematode worm are called for, and also into the probable protozoan parasite producing yellow-liver.

6. Studies as to the cause and remedies for the defects in feathers, technically known as "bars," are in progress, and many facts and observations are being accumulated.

7. Selective breeding is now carried on to a large degree, and calls for a careful record of results; the establishment of distinct pure types should be encouraged. Encouragement should also be given for the discovery of the occasional appearance of birds with specially pronounced desirable characteristics (mutations).

EXPERIMENTS UPON THE DESTRUCTION OF PRICKLY PEAR, 1907.

FINAL REPORT.

By E. A. Nobbs, Ph.D., B.Sc., Agricultural Assistant.

The following is a statement of the conclusions arrived at after a comprehensive trial, under precisely identical conditions, of the various preparations used or recommended for the extirpation of the prickly pear, in accordance with instructions of the 4th November last.

The ultimate results are here briefly stated. The full account of the procedure is detailed in an Appendix, which includes and brings up to date the interim report of the 14th May last.

In all, fifty plots embracing four distinct processes and eighteen different preparations were required to carry out the experiments. The majority proved futile, as was to be anticipated. Effective treatment, without, however, considerations of cost, was recorded in seventeen instances, but of these the majority fall out, on the ground of prohibitive cost.

In the accompanying table a plus sign, "+," has been chosen to represent instances of successful destruction, a plus in brackets, "(+)" indicates a partial success, while a minus in brackets, "(—)," implies a modified failure, a failure, that is, in which there are indications of the material used having done considerable damage to the prickly pears, though not adequately for practical purposes. A minus sign, "—," shows that the material has been ineffectual or that the pear after at first suffering is in process of being regenerated.

Table I.—Summary of Results.

	A			B	C	D		
	Grubbing Trees and Spraying Heaps.			Injection of Standing Trees.	Injection of Stumps.	Spraying Standing Trees.		
	1	2	3			Half.	Normal.	Double.
Arsenite of Lead ...	+	+	+	(+)	+	(+)	+	+
Steyn's Preparation ...	+	+	+	—	(+)	(+)	+	
Pienaar's Preparation ...	+	(—)	—	—	—	—	—	—
Cairn's Preparation ...	+	+	+	+	+	(+)	—	—
Du Plessis' Preparation	(+)	—	—	—	—	—	—	—
Atlas Preparation ...	+	(+)	+	—	(+)	—	(—)	(—)
Mare's Preparation, No. 1					—		—	
" " No. 2	—			—				
" " No. 3	(+)	—	—	—				
Cooper's Dip ...				(+)				
Common Salt ...				—				
Blue Vitriol ...				—				
Green Vitriol ...				—				
Arsenate of Lead ...				—				
Cyanide of Potassium ...				—				
Sulphur ...				—				
Caustic Soda ...				—				
Paraffin ...				—				

Table 2 gives the cost of the materials per morgen in the case of the effective methods only, and comparing the costs, it becomes at once obvious that none of the proprietary preparations offered approach Arsenite of Soda in cheapness.

Several vendors of these preparations recommend application according to one particular method—injecting, spraying, etc.—but for the sake of completeness each of the four methods that suggested themselves was used in order to give every material the fullest possible opportunity of demonstrating its merits and properties.

In every instance the Arsenite of Soda imported by the Government proves to be the best material to use for the extirpation of prickly pear.

Table II.—Relative Costs of Materials required per Morgen in Effective Methods.

	A	B	C	D		
	Grubbing Trees and Spraying Heaps.	Injection of Standing Trees.	Injection of Stumps.	Spraying Standing Trees.		
				Half.	Normal.	Double.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d
Arsenite of Soda ...	0 12 0	0 5 6	0 18 9	0 16 9	1 13 6	3 7 0
Steyn's Preparation ...	3 1 6	...	1 17 6	8 0 0	16 0 0	...
Pienaar's Preparation ...	7 8 5	...	...	...	...	...
Cairn's Preparation ..	2 9 2½	4 8 0	7 10 0	1 6 0	...	...
Du Plessis' Preparation...	4 9 1½	...	...	...	...	...
Atlas Preparation ...	4 12 3	...	7 7 3	...	...	...
Cooper's Dip ...	...	0 18 7	...	...	...	...

In comparing the different processes the Table 2 must not be taken as the guide of cost, since the figures given represent only the cost of material, and so, while forming a fair basis for comparison where the same method is pursued, and different materials only used, yet is no criterion between different processes.

Grubbing up the trees and spraying the heaps with a 1·1 per cent. solution, 1 lb. to 9 gallons, the customary method (A), requires comparatively little Arsenite of Soda—the least indeed of the thoroughly effective processes. This is, however, in practice probably the most costly of the methods tried, on account of the laborious nature of the operation, and is only to be recommended in the case of clearing land for arable purposes where the grubbing up of the roots is a necessary part of the work in any case Good grazing land infested with pear may with advantage be cleared by the simpler method of felling the trees, spraying the heaps, and injecting about one to one and a half tablespoonsful of a 10 per cent. solution of Arsenite of Soda (1 lb. to a gallon of water) into the butts of the stumps projecting above the ground (C). These experiments have clearly shown the efficacy and economy of this method, which deserved to be applied more largely than has been the case in the past. Indeed, this process has been little, if at all, used, and has much to recommend it, for, besides cheapness, it is simple and rapid, and the veld is not broken up. With the destruction of the overshading and soil-robbing prickly pears, the natural herbage soon re-establishes itself on the cleared land. The process of spraying standing trees with a 5 per cent. solution of Arsenite of Soda (1 lb. in 2 gallons of water), (D), though not as efficacious as the abovementioned methods, may yet be recommended for use in checking the pro-

gress of the prickly pear on steep hillsides and on krantzes where more thorough work is impracticable, but where extirpation is very desirable, as it is from such situations that the pest most readily spreads to fertile ground below. The spray will reach trees quite inaccessible to the spade or axe. The drawback to this process, not fatal but serious, is the difficulty of the water supply.

As the outcome of the experiments it is obvious that with even the cheapest known preparations used in the cheapest manner the cost of the operation may at times be greater than the value of the land when cleared. The most costly eradication would be amongst krantzes, precisely the worst sources of infection. The experiments have brought to light no talisman for extirpating prickly pear, but have clearly demonstrated the superior efficacy and cheapness of Arsenite of Soda.

Appendix.—Details of the Experiments.

The occasion of the experiments under report was the following paragraph in the report of the Select Committee on Prickly Pears, 1906:—

"Your Committee is favourably impressed with the efforts being made by private individuals to discover extirpators more effective and cheaper than the Arsenite of Soda at present distributed to farmers, and recommends to Government the careful examination and trial of those alleged remedies, and the encouragement of any such preparations which prove efficacious and financial assistance through railway rates or otherwise.

"Your Committee is of opinion that if mechanical devices for the destruction of prickly pear could be introduced, the same would deserve every encouragement and assistance from Government. It is felt that sufficient attention has not yet been bestowed upon and directed to the study of effective methods of eradication.

"For these and kindred purposes the Committee urges upon Government the desirability of carrying out experiments with all such preparations and processes as may appear feasible with a view to ascertaining and demonstrating the most effectual and economical means of dealing with both species of Opuntia concerned.

"For this purpose it is recommended that Government utilise some badly infested public lands, such as Cookhouse or other suitable area, and your Committee would suggest a sufficient amount to be set aside for such purpose during the next year."

In accordance with instructions from the Secretary, the aim of these experiments has been to compare together under uniform conditions the various extirpators now being offered to the public and to give them careful trial under precisely such circumstances as under ordinary practice they have to encounter. A number of other simple remedies have from time to time been recommended, and it was thought well to test these along with the special preparations in order that the experiments might be as comprehensive as possible and conclusive, and that all alleged specifics may be simultaneously compared. Several preparations had to be tried in different strengths. Hence the large number of plots, from which ultimately only a limited number are by a process of elimination to be selected as the best.

The intention in the first instance was to conduct experiments at three centres for the purpose of testing the various processes and preparations under different climatic conditions and in order that a thorough check of the accuracy of the separate results might be formed. Sites were secured at Uitenhage, Cookhouse, and Glenharry (Graaff-Reinet), and a commencement made at the last named place. The manual labour connected with the experiments was found to occupy more time than had been anticipated,

and there was much other work for Mr. Thornton, to whom was deputed the care of the actual operations, to attend to, hence after some progress had been made at Glenharry it was found expedient to concentrate our available energies there and postpone for the present the experiments elsewhere. This proved an economy of time and money, and the trials lost nothing thereby, as the conditions met were all that could be desired for the purposes of a practical and thorough test of the extirpators.

Through the attention drawn to the subject by the sittings of the Select Committee a number of preparations claiming to be efficient extirpators were brought forward. It would have been invidious to omit any from the trials, so that all had to be considered. Supplies were procured from the manufacturers or agents at reduced or cost prices.

It may, however, here be remarked that the figures used in stating the cost of the experiments are based on the usual prices charged, not on the special quotations made to the Department. This is, of course, the only fair basis for comparison. These figures must not be regarded as general averages applicable to all cases. They refer to particular instances, but are so far of importance in that they show relative costs under precisely uniform conditions. The figures given, it must be noted, are for cost of materials only. In each series the labour is approximately the same for each plot, and the relative amount of labour in the four methods is patent. Moreover, farmers are, as a rule, in a position to obtain labour on advantageous terms by contract or to employ their own boys at slack seasons, hence the wages bill is no criterion, and would only serve to confuse the issue as between the actual and relative merits of different preparations. Acknowledgment is due to Mr. Walter Probart, of Glenharry, who gave every facility for carrying out the work, and for whose courteous aid sincere thanks are tendered.

In the preparation of this report the terms leaves, stem or trunk, and tree have been used in their obvious, if botanically incorrect, sense, as being better suited for the purposes of general description than the more technically accurate phrases.

In order that a fair comparison of the various preparations might be secured, each had to be tested in strict accordance with the instructions supplied by the manufacturer, but it was thought well at the same time to test each proprietary extirpator in each of the separate methods which has been found appropriate for the purpose of exterminating prickly pear.

Four distinct methods are practised, and each will be dealt with separately. For convenience sake they are designated:—

A. Grubbing the prickly pears, making heaps and spraying.
B. Injection of standing trees and making heaps and spraying.
C. Felling, injection of stumps, and making heaps and spraying.
D. Spraying standing pear with solutions of different strength.

Methods B and C involve as a subsidiary process the main element of method A. The results, so far as sprayed heaps go, have therefore been brought together, and are found to agree with each other. The conclusions are thus checked and confirmed.

Method A.—Trees grubbed up—Heaps sprayed.

This is a procedure commonly adopted by farmers when using Arsenite of Soda as the destroying agent. In so far the first plot referred to is hardly experimental, but for the purposes of comparison it was considered necessary to carry out one plot with the Government extirpator. For completeness the procedure is here detailed.

All the prickly pear is grubbed up by the roots and chopped into convenient sizes, trunks and large limbs being split. Every fragment is care-

fully collected into heaps, which are generally 6 to 12 feet wide, of any length and as high as the prickly pear can conveniently be piled. These heaps are then sprayed with a solution of Arsenite of Soda, the standard usually adopted being one pound to nine gallons of water. In process of time, varying from a few weeks to as many months, the heaps decompose, a few new leaves shooting out, which are readily dealt with. In the other experiments where, incidentally, heaps of leaves had to be destroyed, precisely the same process was followed so far as heaps of chopped branches and leaves were concerned.

The Arsenite of Soda (Government exterminator) has in all three instances upheld its name as unquestionably efficacious, and may without further comment be written down as thoroughly successful. Satisfactory as it is to have this proof and assurance that in the past we have been working along right lines, yet it is to be regretted that none of the proprietary exterminators used have proved themselves superior to Arsenite of Soda, for at best it has to be admitted that the use of the Government exterminator in this manner is laborious, slow and expensive. So much is this the case, indeed, that it can seldom prove immediately profitable, except on land intended for crops where the removal of the roots is in any event a necessary proceeding. Only exceptionally can this method prove feasible in the case of grazing land. Yet all the other methods tried, successful or not, were very much more costly than that with Arsenite of Soda.

Steyn's preparation did good work when used in this manner, but the high cost of the materials, £3 1s. 6d. per morgen as against 12s. in the case of Arsenite of Soda, puts it at once out of court.

Cairns' preparation also proved effectual, and though less costly than the above, was yet dear as compared with the Government exterminator, the cost of the material required working out at £2 9s. 2½d. per morgen.

The same is also true in the case of the "Atlas" preparation, which, while effectual, was yet too expensive at £4 12s. 3d. per morgen to deserve further consideration.

None of the proprietary preparations are recommended for application as a spray upon heaps, not even those above mentioned which were effectual when so used.

None of the other preparations or poisons tried were of any avail, except that of Mr. Pienaar, and this only to a limited degree.

The cost of materials for one morgen works out as follows:—

1% Arsenite of Soda	£0	12	0
2½% Steyn	3	1	6
5% Pienaar	7	8	5
2½% Cairns	2	9	2½
2½% The Atlas Preparation	4	12	3
2½% Mare (No. 2)	0	15	4½
2½% Du Plessis	4	9	1½

It is of interest to note the sum total of the results of each preparation used in all four ways.

Arsenite of Soda has proved effective in every instance—as a spray on heaps and on living trees, as an injection in standing trees or on stumps. Of the eight plots in which Arsenite of Soda was used, six may be regarded as conclusively successful, the other two partially so. None of the other exterminators have been nearly as uniformly successful, and it is satisfactory to know that the article recommended in 1893 by Mr. A. C. Macdonald, Agricultural Assistant, and now in general use, the one supplied to farmers at cost price by the Department, is the best and cheapest yet.

Steyn's preparation does well on sprayed heaps and when sprayed on standing trees. This material is recommended by its inventor for application as a spray, not as an injection, for which use it is not successful. The relatively high price compared with Arsenite of Soda, however, condemns it utterly.

Pienaar's preparation, on the other hand, is not intended as a spray. It was only partially successful when used as such on a heap, and in no other instance at all.

Cairns' exterminator did well on grubbed-up heaps and as an injection, but was of less service used in the manner recommended by the inventor, as a spray on standing trees. The price asked, again, kills it.

Du Plessis' preparation gave discouraging results in every case, except a partial success on grubbed-up heaps in one instance.

The "Atlas" preparation did moderately well when used as a spray on heaps and injected into stumps. For living trees as an injection and a spray it failed.

Mare's preparation did not succeed in any single instance.

All the other materials, except Cooper's dip to a limited extent, are inoperative.

In the course of these experiments several interesting features have shown themselves which deserve brief mention. There is a marked difference between the action of different preparations, each has a characteristic effect, and the symptoms are quite clear in each instance. The different preparations also manifest great variation in rapidity of action. What appear to be the strongest poisons do not act as well as injections, apparently killing the tissue close to them so quickly that the poison has not time to travel far and be diffused throughout the whole tree. The local destruction causes weakness at the point of injection, and the limb or tree falls over while still fresh and the leaves are able to strike root, and the pest is only spread instead of being destroyed. In other instances strong poisons seem to cause the leaves to become weak at the joints and to fall off before the poison has permeated and killed them. In such cases, within a few years, unless something is done, the prickly pear will be worse and denser than ever. The difficulty and danger of working with certain preparations as a spray has already been alluded to. It was found that Steyn's preparation is the most hurtful, Arsenite of Soda next, then Cairns' and the "Atlas" preparations. All cause a painful and unpleasant rash, developing into yellow watery pustules. Steyn's preparation used at a 10 per cent. strength penetrates more deeply under the skin, particularly under the finger nails, which become soft and very painful, occasionally suppurating. Arsenite of Soda also burns severely under the nails. Steyn's preparation is found not only to burn the skin, but, in spite of masks, to cause considerable irritation to the lungs, manifested by a feeling of choking and coughing. This peculiarity was also noticed when caustic soda was used as a spray.

Another observation constantly remarked is that the doornblad prickly pear is far more readily destroyed by poisons than is the kaalblad. The kaalblad is also much harder to bore the auger into than is the doornblad. This tenderness possibly explains in some measure the avidity of all stock for the prickly form and the need of protective spines.

In the above notes frequent reference is made to the leaves on heaps commencing to sprout anew, fresh green leaves springing out from dry and decaying ones. This was characteristic of all sprayed heaps, though more notably the case with some than with others. Two reasons appear to explain this fact. The first cause is undoubtedly that the unusually wet season, which not only washed the poison from the surface of the heaps, but also enabled the detached limbs and leaves to remain green longer than would have been the case in an ordinary summer, and so to persist and

throw out buds. The other reason is the smallness of the heaps on the plots. Had they been larger, decomposition would have been more active and the proportion of outside leaves would have been proportionatel, less. A confirmation of this fact is found in the observation that both in the case of injection and of spraying it is the leaves most exposed to the s and heat which first show signs of the poison taking effect.

A serious cause of loss and annoyance is the weak and flimsy chara of the drums in which these strongly poisonous preparations are sent. With few exceptions, consignments arrived leaking, and apart from di loss, storage was thereby rendered difficult. Corrosion of the thin m drums must be provided against by any successful preparation. Herein an additional advantage of Arsenite of Soda and Steyn's preparation, w are distributed in the dry state.

In certain instances, particularly in the process of spraying stanc trees, considerable injury has been done to thorn trees, shrubs, herbage, but these seem, as a rule, to be recovering.

Fortunately, there was no demonstration of the relative toxic of different extirpators on live-stock, but ostriches have been turn the plots within two months of the conclusion of operations with harmful effect. In many of the decomposing leaves the larvae of were present in quantities which would hardly be the case were much poison still present.

It would have been very pleasing had these comprehensive tria covered an exterminator superior to the Arsenite of Soda in genera Such, however, is not the case. The value of this material when u methods additional to the customary way of spraying heaps has, ho been established, and is deserving of attention, as the arduous pro stubbing is not always necessary or desirable. Other processes have themselves to be effective, and certain of them would, no doubt, come into use if the prices could be reduced to compare favourably with that of Arsenite of Soda, which, though distributed at cost price, cannot be regarded as a cheap commodity.

THE LONDON DAIRY SHOW OF 1907.

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…harles du Pl. Chiappini, the Trades Commissioner for Cape of Good Hope in the United Kingdom.

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visited the Dairy Show of the British Dairy Farmers' Association, …t the Agricultural Hall, London, from 8th to 11th October, 1907, in-…, and saw much of interest in connection with the dairy part of …ulture, a report of which might be of some interest to the farmers in … Colony.

…he show was the 32nd of its kind, and I learned that while the total …f entries fell slightly below the total of last year, the show was … the best by far that had ever taken place.

… various departments embrace not only live cattle, but also goats, … and pigeons. The largest exhibits, of course, are in the products …ing, namely, cheese, butter, cream, etc. There is also a very large …ually for mechanical appliances, and a considerable portion of the … devoted to the exhibition of these.

… so far as the cattle are concerned, I noticed that considerable pre-…nce seemed to be given to the Shorthorn breeds. There was also … large display of Jerseys and Kerry Dexters, and the more delicate …f cattle. Goats were also present in considerable numbers, and I …ck with the great variety which they exhibited. So far as poultry and pigeons are concerned the dairy show seems to be taken advantage of by most of the fanciers in this particular line, as the very large entry shows.

A notable feature was the large increase in cheese, and this, perhaps, is to be accounted for by the great prominence given during late years to the fact that Cheddar cheeses are being imported into the United Kingdom from Canada and other countries in such enormous quantities. The British cheese makers apparently do not propose to allow themselves to be cut out by foreign competition in this way, and as a consequence many farmers have in late years gone in for cheese making on a large scale.

The bacons and hams was the largest entry since 1904, and exhibited considerable variety of the products of the bacon factory.. I am assured by experts in this particular line that the show in bacon and hams was as fine as has ever been seen in the United Kingdom, and the bacon especially showed the result of careful selection in pig breeding.

Butters were shown in the minor hall of the exhibition, and were the largest entry that has been for many years. The reason of this is, that co-operative butter factories in Ireland and elsewhere have come forward with an increased number of entries. Colonial entries were also in evidence to the number of 125, drawn chiefly from New Zealand, Victoria, Queensland, and New South Wales. Canadian butters were not so much in evidence. It was interesting to notice that the first prize in this particular class for sale butter was given to a box from the Down Co-operative Company of Queensland, and no doubt the award has given much satisfaction to the butter makers of that Colony.

I hope to see the day when we in Cape Colony will be well represented in this Show, and that we may have a share of the success distributed amongst the first-class makers of dairy produce.

I was particularly interested in the entries of machinery and appliances, and had the advantage of some technical assistance in discovering what were new appliances exhibited for the first time. It appears that advantage is taken of the London Dairy Show to exhibit any new invention which may have been brought out during the year, and there are many visitors from all over the world who eagerly look for such inventions.

During the present year the principal interest in so far as competition in the appliances class is concerned centred round the competition devoted to milk strainers. There were ten entries in this particular class, and the competition was very severe. It was not until the close of the Show that the awards were disclosed, the gold medal having been given to the Dairy Outfit Company of London.

There were also exhibits in improved apparatus for the distribution of milk, a new butyrometer, bottle-filling machines, cream separators, churns, and other appliances of a minor character used in the dairy. There were very few exhibits of a novel character in the large way, and the principal appliances in this particular division were exhibited by Messrs. William Douglas & Sons, Ltd., Putney, London, who showed their well-known refrigerating plant as applied to the cooling of milk, by means, first of all, of a primary cooler and then a secondary cooler, this being the apparatus with which they carried off the gold medal some few years ago. They also showed a splendid application of the refrigerating machinery to the cooling of a chamber; I cannot imagine a chamber which could be better constructed than the one I have referred to. The atmosphere was cold and sweet, and I apprehend that this is the butter maker's want. The same firm also exhibited some novel egg testers, which I think are entirely new to egg producers, and seem to be new also to this Show, inasmuch as they were awarded a gold medal.

The other appliances which arrested my attention, and which were exhibited by the same firm, were a butter worker of the usual pattern, fixed with automatic reversing plough, which curled round the butter automatically, and thus obviated the necessity for using "Scotch" hands; there was also a cream ripener, with spiral cooling or heating arrangement inside, as also a combined churn and butter worker, which struck me as economical of space.

A notable feature of the Show were the non-competitive exhibits, and these were spread over a very considerable area, but those which seemed to me the most attractive were the exhibits of the British Dairy Institute and University College, which is a purely educational institution The object which the College has in view in exhibiting at the Dairy Show is to show what kind of work the students are called upon to do while following the course of instruction at Reading. The products exhibited were of the most varied and high-class character, and included cheese of various kinds, and of many of the less known kinds, whose production is associated with France and other countries, and it was made clear that they can be made as easily in England as anywhere else, or, for that matter, in any other country. So far as I could gather, it is a question of isolating the particular mould or bacteria used in flavouring the cheese, and then sterilising the milk or cream, so that the particular mould or bacteria may find a fresh feeding ground without being interrupted by other bacteria which may have been taken up from the atmosphere. In such an institution there are, of course, many departments in technical instruction, and the exhibit at the Dairy Show is meant to convey how these various departments are worked, such, for example, as milk testing and milk analysis, the preparation of rennet, and the examination of useful or injurious bacteria.

On the whole, I am inclined to think that the 32nd annual show of the British Dairy Farmers was a creditable and instructive one, and the dairy products exhibited seem to have reached a state of high perfection.

EXPERIMENTAL CROPS IN CAPE COLONY.

A REPORT ON MEALIES.

(By Eric E. A. Nobbs, Ph D , B.Sc., Agricultural Assistant.)

To offer instruction to the South African farmer on the subject of growing mealies might be regarded as of the nature of an impertinence. It is remarkable how often we find the crop grown by the Kafir superior to that of the white farmer. The advantage of the former in regard to the labour supply and the fact that mealies loom larger in his horizon in a measure account for this, but the fact remains that our returns per acre, or per bucket sown, might with a little care be much greater than they are, and our profits proportionately larger. Rapid progress is being made in the use of implements to handle this crop, with the natural results that wider espacement and greater regularity are leading to better and more uniform crops. Drills, listers, horse hoes and even mealie harvesters and shredders are beginning to be known and appreciated, and with the more general introduction and the application of artificial fertilisers a revolution in our ideas of the mealie crop must ensue. Side by side with these improvements it is very desirable that we should introduce, if they exist, improved varieties which will, other things being equal, give an enhanced crop in return for the mere trouble of procuring the right sort of seed. The old "German yellow" is to-day our standard variety, an improvement on the mixed samples known as native mealies. Of late years the "Hickory King" has come to the front as an undoubted improvement. There yet remain to be tried an infinite variety of mealies, and no doubt some of these will prove particularly suitable to certain regions. In our higher altitudes a quick maturing mealie is essential, not necessarily a quick growing sort, for it may remain small in size yet bear well and ripen before the advent of early frosts. In the Western Province mealies succeed less well than in the east and north, and may best be grown there for the purposes of green feed for cows during the hot and dry summer months. There is a demand, and a growing one, for sweet green mealies for table use, and for small-sized mealies which may be fed to poultry without previous crushing. Elsewhere, hardiness and abundance of yield are the chief desiderata. Naturally all these properties, in part conflicting, cannot be found in one and the same mealie, indeed experience has shown that the general purpose mealie is pre-eminent in no virtue. A great number of parcels have been distributed, but the numerous reports as yet received are only a small proportion of those. This experimental work can only achieve its best results if farmers getting and sowing the seed will in due course fill up the forms issued to them even in the case of failure or destruction by locust, stalkborer, frost, or any of the other troubles that afflict the mealie. For the information of those interested the following reports have been compiled, and thanks are due to those who have furnished the material for the statements now published.

Leaming Improved Mealie.

This mealie is a strong-growing variety, reaching a height of five feet on a single unbranched stalk, bearing nominally two large cobs covered with a long flat good grain. The experiments prove it to be a heavy and early cropper under favourable conditions. It frequently receives enthusiastic eulogies from those who have tried it, but opinions differ as to its merits as some consider it somewhat delicate. It cannot be expected that one and the same variety will prove the best everywhere, and the Leaming Improved does appear to suffer from frosts and injury by locusts, surface caterpillars (*mestwormen*) and the stalkborer, although on this matter it is hardly the mealie which is at fault. Out of ninety-three reports which have been received to date, some fifteen failed owing to causes beyond control, floods, drought, frosts, hail, baboons and insects, but the remainder, both favourable and otherwise being individually so instructive, are published herewith.

Cathcart (Mr. G. L. Froneman).—Sown 10th November, 1906. Result: Good. Sown thickly in drills and broadcast on irrigated land. Reaped end of February, 1907. Yield: 50 lbs. from 3 lbs. sown. Very suitable and will certainly pay in this district. Grew splendidly, and will yield more grain off one cob than any other mealie. A quick grower and very strong. Ripens in about 105 days. Those sown broadcast eaten by worms as soon as they came up.

Cathcart (Mr. H. G. van Niekerk).—Sown broadcast and thinly on unirrigated land. Totally destroyed by locusts. Cannot offer an opinion as to its suitability for this district, but think so

Cathcart (Mr. Jas. Field).—Sown 29th September, 1906. Result: Bad. Crop looked very promising, but was cut up by hail I should think this kind of mealie ought to do well and should pay.

Komgha (Mr. W. A. Edmonds). -Sown 22nd December, 1906 Result: Good. Suitable to district. Seems a quick grower. Still standing. Attacked by grub.

Albany (Mr. A. Kent) --Sown: No date given Sowed this season on river bank. All washed away by flood.

Albany (Mr. H. Nosworthy).—Sown 1st August, 1906. Result: Fair. Planted thinly in rows on unirrigated soil. Think next sowing will yield better. Reaped 15th January, 1907. Yield: 25—1. Attacked by cut-worm when flowering.

Trappes Valley (Mr. Job Timm).—Sown 1st October, 1906. Result: Good. Sown moderately thin in drills on unirrigated land. Reaped 1st February, 1907. Yield 8 lbs. from 2½ lbs. sown. The grain I received was extra good, and I believe will be a grand mealie to grow, owing to its early cobbing (exactly two months after planting). Owing to drought, grain was shrivelled and light.

Trappes Valley (Mr. Milton Timm).—Sown 6th November. 1906. Result. Poor. Sown in drills 2 ft. by 5 ft. on unirrigated land. Reaped end of March. Yield 23 1-5th--1. The crop did not do well. Weather very dry, and I am doubtful if they will pay here.

Bathurst (Mr. R. W. Elliott).—Sown 28th August, 1906. Thinly sown in drills on unirrigated soil. Destroyed by mealie grub. The few remaining plants only grew 18 inches high, and had no grain whatever. Unsuitable.

Grahamstown (Mr. J. H. Erasmus).—Sown 7th September. 1906. Result: Excellent. Sown broadcast and thinly on unirrigated land. Reaped 6th January, 1907. Yield 16⅔—1. A very fine mealie and stands drought well. Most of it washed away in October. Suitable, and will pay in this district.

Salem (Mr. Basil Gardner).—Sown 11th December. Result: Good. Suitable, and will pay in these parts. Grows very rapidly, and looks fine and healthy. Unfortunately crop was entirely destroyed by insects (sample enclosed) when about three weeks old.

Salem (Mr. Jesse Long).—Sown 2nd October. Few mealies came up. Heavy rains making ground very wet and caked on surface. Most of seed believed to have rotted in the ground. I don't consider this mealie any better than our ordinary yellow seed.

Highlands (Mr. A. G. Daniell).—Sown 12th October, 1906. Result: Bad. Sown thinly and broadcast on unirrigated land. Weather very wet. Attacked by grub when about 6 inches high. Being an early mealie, I consider it would pay in this district, but it should be sown later.

Port Elizabeth (Mr. Robert Nance).—Sown 20th August, 1906. Result: Indifferent. Sown thinly in drills on unirrigated land. Kept well hoed. Reaped 11th February, 1907. Weather, too much rain. Don't consider it suitable for this district, and will not pay.

Port Elizabeth (Mr. Loton Tipper).—Sown middle September. Result: Poor. I consider it unsuitable for district, and will not pay. Very few cobs, coarse, and never filled out. I much prefer the Yellow Colonial Mealie from all points of view.

Port Elizabeth (Mr. A. Jones).—Sown 11th September, 1906. Result: Poor. Thinly sown in drills on unirrigated land. Reaped 3rd February, 1907. Practically destroyed by baboons The few cobs secured were fair Doubtful if it will answer here.

Humansdorp (Mr. J. B. Weinrich).—Sown 8th December, 1906. Result: Good. Answered very well here. A very desirable mealie to grow. Has several advantages over ordinary mealies, viz., it has only one stalk, which is free from shoots; corn is easily separated from the cob and is very floury and soft. Reaped 8th April, 1907. Cattle partially destroyed crop, so cannot give the yield. Intend planting this seed earlier this year.

Hankey (Mr. E. W. Kirby).—Sown 15th September, 1906. Result: Good. Sown in drills 4 feet apart on unirrigated land. Reaped January, 1907. Yield: 116⅔—1. Badly damaged by black cut worm and a black beetle ½ inch in length, which burrows down and cuts off the young plants. Stalkborer also did considerable damage. I reckon 15 per cent. of the crop was destroyed. I consider this mealie suitable for district if sown early, and under irrigation ought to pay.

Uitenhage (Mr. P. Keuge).—Sown 21st December, 1906. Result: Destroyed by locusts in February.

Knysna (Mr. J. Duthie).—Sown 15th October, 1906. Result: Good. The mealie is a fine sample, and I feel sure would be suitable to district if sown early. On account of sowing late, was attacked by small black-beetle called "Christmas" beetle, also by red ants in ground. Only a few plants have come to maturity, which I intend keeping to plant next season in August.

Knysna (Mr. F. Franzen).—Sown end of October. Result: Good. Very suitable, and should pay well. Unfortunately attacked by worms in the early stage Reaped 12th March. Yield: About 12½—1.

George (Mr. C. H. Robertson).—Sown late September. Destroyed by caterpillars when quite young. May do better next year. Not reaped yet.

Mossel Bay (Mr. W. Howard).—Sown September. Result: Bad. Seed came up badly and compared unfavourably with other kinds.

Villiersdorp (Mr. C. Kange).—Sown 1st December. Result: Good. Suitable to district, but will pay only as a green fodder. Grew well, and are very healthy and strong plants, but had to be cut off before it came to maturity on account of drought.

Riversdale (Mr. J. W. Smalberger).—Sown: Date not given Mealies failed owing to lateness of sowing and wet season.

Klipheuvel (Mr. L. C. F. Smith).—Sown 1st September, 1906. Result: Good. Thinly sown by hand and in good time. Reaped 15th March, 1907. Yield: Not given. Suitable for district, and will pay.

Kalabas Kraal (Mr. P. J. de Villiers).—Sown 14th August, 1906. Result: Bad. Not suitable. Reaped in December. Yield: Very small. Will not pay in this district.

Bellville (Mr. C. W. Duminy).—Sown in August, 1906. Result: Good. Very suitable for this district, and will pay as a green fodder. Growth remarkably good. As a table mealie it is unequalled, both in flavour and delicacy of substance. Yield small, mostly cut for cattle.

Mamre (Mr. M. J. de Villiers).—Sown in September. Result: Poor. Not suitable for this district. Earlier than the Cape Mealie, but fails to grow to any particular size. Taking it all round it is much inferior to the Cape mealies. Attacked by insects.

De Doorns (Mr. Z. A. B. Burger).—Sown 15th August. Result: Fair. Not as good as our old White mealies. Reaped January. Yield: 400—1.

Matjesfontein (the Hon. J. D. Logan).—Sown 23rd May, 1906. Result: Bad. Not suitable to district unless under irrigation. Frosts too severe in winter. Young plants killed as soon as they appear above ground. (Sown out of season.)

Biesjespoort Station (the Hon. W. Ross, M.L.C.).—Result: Fair. Suitable, and should pay in this district. Crop destroyed by locusts.

Warrenton (Mr. A. Robinson).—Sown October 2nd. Result: Indifferent. Not suitable to district. Half the seeds sent me were sown on dry mealie lands, which were entirely destroyed by locusts.

Postmasburg (Mr. L. H. van der Schyff).—Sown 15th November, 1906. Result: Good. Suitable, and will pay in this district. An early grown mealie.

Belmont (Mr. W. H. Wayland)—Sown 14th November, 1906. Mealies came up badly, only 10 per cent. germinated. Stalks stunted and weak, and the cobs being near the ground the few that formed were entirely destroyed by springhares. I don't much like the variety, the grain being long, narrow and flat. I prefer a full, round, and hard grain Crop would probably have ripened about middle of March.

Mafeking (Mr. E. Bullied).—Sown 14th June, 1906. Result: Fair. Partly destroyed by locusts. This is a good mealie, and well worth a further trial. Seed to be sown in November.

Vryburg (Mr. H. Rens).—Sown 29th December, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Crop destroyed by locusts. I consider this mealie very suitable for this district. It grew well.

Mafeking (Mr. J. W. Brodie).—Sown 12th November, 1906. Result: Bad. Sown thinly and broadcast on unirrigated land. Reaped 12th February. Seed germinated badly; very few plants came up. Its chief feature is its quickness in maturing.

Belmont (Mr. M. Clark).—No date. Had a good crop on land, but locusts destroyed it while young. Is not fit for use.

Kimberley (Mr. E B. Thompson).—Sown 16th January, 1906. Destroyed by locusts. Mealies grew very well on same soil last season.

Colesberg (Mr. J. Jooste).—Sown 15th October, 1906. Result: Good. Six pounds of seed sown yielded 800 lbs. This is a good mealie, ripening early, and giving almost double the crop produced by the old bread mealie.

Richmond (Mr. A. P. de Villiers).—Sown October, 1906. Result: Good. I consider that this mealie is both suitable, and will pay in this part. It grew better than the Thoroughbred White Flint and Snow White Dent.

Aliwal North (Mr. A. Vickers).—Sown 2nd December, 1906. Result: Fair. Sown thinly and broadcast on dry lands. Reaped 28th March, 1907. Yield: 5—1. I consider it will pay well if sown early.

Aliwal North (Messrs. Sweetman Bros.).—Sown 17th October, 1906. Result: Good. Suitable and will pay here. Reaped 20th March. Good yield expected.

Philipstown (Mr. G. M Botes).—Sown 17th October, 1906. Result: Good. Sown on good red Karroo soil. Cobs were very small, from two inches to five inches. Yield: 10 lbs. from 40 plants. Reaped, March, 1907. Owing to frost, only 40 plants saved.

Campbell (Mr. W. C. Hauptfleisch).—Sown 1st November, 1906. Destroyed by locusts, but prior to destruction promised very well.

Burghersdorp (Mr. John Forbes).—Sown 3rd November, 1906. Result: Good. Sown in drills three feet apart on irrigated land. Reaped first week in February. Yield: 71¾—1. Mealies did not come up well; a good many gaps, which were filled in. A one-stalk mealie, with sometimes only one, but generally two very fine cobs. Cobs almost too large for my sheller. Yield was splendid. I like this mealie and mean to grow a quantity next year. As a green mealie its flavour is not nice. Suitable to district, and will certainly pay.

Molteno (Mr. W. H. Tapson).—Sown 20th October, 1906. Result: Good. Suitable to district and will pay. About one-third of the stalks had no cobs, caused, I think, by a very heavy hailstorm, just as they were coming into bloom. The cobs are very fine. Reaped 26th March, 1907. Yield: 50—1.

Dohne (Mr. J. Carlin).—Sown 25th October, 1906. Result: Bad. Sown in drills. Reaped 15th April, 1907. Yield: 13½—1. I don't think anything of this mealie.

Queenstown (Mr. S. A. McConel).—Sown 21st September, 1906. Result: Fair. Thickly sown in drills on irrigated land. Reaped in January. Yield: 53¼—1. Attacked by grub when coming up. I consider it suitable for district, but I don't care for this mealie, being too light, with only one stalk and one cob, and grows too tall. Not a profitable mealie for selling purposes.

Queenstown (Mr. W. J. Marshall).—Sown 1st October. I consider this mealie suitable, and will pay in this district. Not more than one-third of the seed germinated, and when the grain was just formed, birds destroyed a large quantity, as they were early. Reaped 1st February, 1907. Yield: 46¾—1.

Blaney (Mr. R. A. H. Pritzkow).—Sown 20th December, 1906. Result: Poor. Sown in drills 2 ft. by 2 ft. on unirrigated land. Being sown late and weather being wet and cold, mealies did not come to perfection. The cobs were small. In good seasons mealies are sown as late as Christmas. The grubs were very troublesome during the whole season. May answer better if sown earlier.

King William's Town (Mr. C. Marillier).—Sown 1st November, 1906. Result: Good. The yield was excellent (150 lbs. from 2¾ lbs.) seeing that only about 60 per cent. of the seed germinated, being very much broken. It is a tougher mealie than the Snow White Dent. In a good season should do well in this part.

Fort Beaufort (Mr. J. L. de Beer).—Sown 20th November, 1906. Result: Good. This mealie is a wonderful cropper, considering that about one-third of the seed failed to germinate, and quite a third, if not more, of the crop was destroyed by the grub, and I obtained 180 lbs. from 3 lbs. sown, two-thirds being destroyed, it really amounted to 180 lbs. from 1 lb., a most remarkable yield.

Alice (Mr. S. P. Allen).—Sown November 5th. Result: Poor. Rather a weak growing mealie, and more subject to the attacks of insects. Hail in early growth damaged it very much. I consider it did not have a fair trial Attacked by worm also when coming through.

Fort Beaufort (Mr. I. Mildenhall).—Sown 16th September. Result. Good. I consider this mealie will be a suitable one for this district, and will pay. It bears a large cob and ripens much sooner than most kinds. Would have had a heavier crop, but some of the mealies were destroyed by the heavy storms.

East London (Mr. A. G. Randall).—Sown 26th October, 1906. This mealie is a puzzler to me. It was attacked to a great extent by insects, but grew about 3 feet high. It flowered, but never a sign of a mealie

Victoria East (Miss Stewart).—Sown November, 1906 Result: Indifferent Did not grow or bear well. Partly destroyed by locusts

Alice (Mr. A Giddes)—Sown 25th October, 1906, and 2nd November, 1906. Result: Fair Sown thinly in drills 3 feet apart on unirrigated land. Reaped April, 1907 Yield: 12¾—1. Five lines completely destroyed by small black grub, other lines were partially destroyed. This happened just as the plant appeared above ground. Under favourable conditions, crop would give good results Grain more of the shape of Hickory King is generally preferred here.

Riet Vlei (Mr. F. W. Odendal).—Sown 30th October Result: Good Answers very well Giving a good yield Reaped 30th January, 1907 Have distributed the yield to other farmers.

Jansenville (Mr P. J. J. Gous)—Sown December, 1906 Result. Fair. Sown broadcast and thinly on irrigated land Reaped March, 1907 Fairly suitable for district, but does not pay well. Attacked by little worms when about a month old.

Jansenville (Mr. O. F. Fourie).—Sown September. When seed came up I noticed that a certain kind of caterpillar was destroying it, working its way right up the stem. Mealie crops along this river are quite a failure

Graaff Reinet (Mr. J. Meintjes). Sown 15th December, 1906 Sown broadcast and very thin on irrigated land Locusts destroyed them, but they sprang up again, but too late. I consider this is not a fair trial. I think this variety suitable for district as we have a short summer.

Steytlerville (Mr. M W. Walton)—Sown December. Result Excellent. Sown broadcast on irrigated land. Very suitable for district, and will pay I consider this the best mealie that I have ever sown.

Sevenfountains (Mr. J. J. Howard)—Sown early December. Result: Fair. Sown thinly in drills on unirrigated land. Reaped 1st April, 1907. Yield: 75—1. A very quick mealie and suitable for district. I like the mealie very much. Yield was very light owing to thunderstorm and crows eating a lot of the plants when very young.

Somerset East (Mr. J. M. L Wessels)—Sown November, 1906. Result: Good. A heavy cropper. Yield of 186 lbs. from 3 lbs. sown. A luxuriant grower, bearing large cobs. Better than the Golden Beauty, and quite my favourite. Intend keeping and growing this variety.

Cala (Mr. C. H. Beckerling).—Sown 24th November, 1906. Result: Good. Did not sow them myself. Gave ½ lb. of seed to a friend, who reports that this mealie grew well and was ripe on the 3rd March. Very suitable to this part, and with favourable weather would yield two crops, and thus pay well. Yield: 30—1.

Riebeek East (Mr. W. H. Emms).—Sown 18th October, 1906. Result: Good. Suitable, and will pay in this district. Grew to about 5 feet, and have on an average two cobs. Reaped 24th February. Yield: 83⅓—1.

Cookhouse (Mr. W. R. Daniell).—Sown 22nd October, 1906. Result: Indifferent. Cannot offer an opinion on this mealie. Grubs attacked it when about three months old.

Witmoss (Mr. J. A. Rigg).—Sown end of September. Result: Good Suitable, and will pay in this district. I am keeping grain for sowing next season Had rain

fallen shortly after sowing, the yield would have been much better. Owing to dry spell of weather the surface of soil baked hard and seed could not force its way through, consequently only about half the quantity sown actually grew. Cobs are fine and large—very evenly covered with a large bright grain. Reaped 28th March. Yield, about 100.

Macleantown (Mr. A. Bussey).—Sown 20th October, 1906. Owing to flood and ground crusting afterwards, seed did not come up.

Oliphantshoek (Mr. J. J. L. Scholtz).—Sown 30th December, 1906. Result: Good. Sown in drills on unirrigated land. Destroyed by locusts. Stands drought, and will pay in this district.

East Griqualand (Mr. J. Strachan).—Sown: No date given. Came up well, but was destroyed by frost. The few cobs I have are nice looking, and may turn out to be a suitable mealie for this district. Will sow again and report later.

Umtata (Mr. H. Vridge).—Sown 15th September, 1906. There was not a single cob of grain to be seen. Rain must have washed out the pollen of the male flowers. Numerous cobs were formed with no grain on them at all. Ordinary yellow mealies and Hickory King in another part of the lands was planted at the same time, and yielded a good return.

Bolo (Mr. A. Elston).—Sown end of November. Result: Poor. Greatly damaged by wind and hail. Owing to lateness of sowing, crop still green. Will probably yield about 20 lbs. from 1 lb. I don't consider it suitable for this district.

Maclear (Mr. Lawrence C. French).—Sown September, October, November and December, 1906. Sown thinly in drills on unirrigated land. Failure due to continuous wet, cold weather. Very few mealies will ripen on this high plaat this season, but the local mealies have done better than these.

Tembuland (Mr. H. J. Van Niekerk).—Sown 19th October, 1906. Result: Indifferent. The crop gave a poor yield, but may do better if sown earlier or later in the season. Partly destroyed by porcupine, so only reaped 8 lbs. from 3 sown.

Aberdeen (Messrs. A. and C. Roberts).—Sown 25th October, 1906. Result: Poor. These mealies came up very badly on account of flood water washing a lot of the seed away. This district is suitable for mealie growing, but don't consider this variety will pay. Majority only bear one cob. Reaped end of February. Yield: $36\frac{2}{3}$—1.

Tembuland (Mr. P. F. Osborne).—Sown 10th October, 1906. Result: Good. Mealie grub destroyed most of the crop, but this is an excellent mealie.

Bolo (Mr. S. Ollis).—Sown 24th October, 1906. Destroyed by hail, and never recovered. They looked well before the hail came.

Clarkebury (Mr. E. D. Clarke).—Sown 22nd November, 1906. Result: Excellent. By far the best mealie I have sown. Had a large cob, good grain, and is the earliest on record. Harvested March. Yield: $161\frac{2}{3}$—1.

LEAMING EARLY MEALIES.

The Leaming Early Mealie is similar in every respect to the Leaming Improved and is, indeed, only another form of the same variety. Of the twenty-seven experiments upon which reports have been received nine were destroyed by locusts, but the rest almost all speak very highly of this mealie.

Vryburg (Mr. D. Robertson).—Sown 14th January, 1907. Result: Excellent. Well adapted for these parts. Were in full flower in early March. Cobs forming and all stooling well, as many as six stalks from one seed. I am quite certain they are a valuable mealie.

Wynberg (Mr. H. Cloete).—Sown early December. Result: Fair. Sown in holes 3 feet square (5 seeds in a hole) on irrigated land. Reaped end of March. Yield: $44\frac{2}{3}$—1. Very fair mealie indeed. Seed was bad, and did not germinate well. Can recommend it.

Vryburg (Mr. A. P. Britz).—Sown 26th December, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Reaped 31st March, 1907. Yield: 25—1. Damaged by locusts in February. Is a grand mealie for this district. Strong and hard; grows from 7—10 feet high, with good big cobs, and gives no shoots.

Vryburg (Mr. C. G. Dennisen).—Sown 1st January, 1907. Result: Good. A good mealie, early and evidently a fair yielder. Ripe 27th March, 1907.

Stellenbosch (Mr. J. H. Eckard).—Sown 5th December, 1906. Result: Good. Stunted in growth owing to late sowing and severe drought. Grown under favourable circumstances, it is a fine mealie. Yield of green fodder, 1¼ tons from 3 lbs. sown.

Stellenbosch (Principal, Elsenburg).—Sown 30th October, 1905. Result: Good. A good, fairly early mealie.

Stellenbosch (Mr. A. C. Buller).—Sown 12th December. Result: Good. Seed received much too late. Doubtful if it will ripen before winter. From its rapid growth I consider this a valuable mealie for green crop. Many heads over 6 feet high in less than 60 days from sowing. The leaf is broad.

Caledon (Mr. J. S. Le Sueur).—Sown 10th December, 1906. Sown thinly in drills on irrigated land. Seed germinated, but the heavy rains killed it. Sown rather late for this district.

Stutterheim (Mr. W. A. Robinson).—Sown 23rd December, 1906. Result: Indifferent. Sown broadcast and thinly on unirrigated land. Attacked by grub when in flower. Does not stand drought well. May do better if sown earlier. Intend giving it a further trial next season.

King William's Town (Mr. W. Page).—Sown 8th December, 1906. Result: Good. This is an early mealie, and grows well. It should be sown earlier; it is quicker than the ordinary yellow mealie. I intend sowing this mealie again.

Queenstown (Mr. J. R. Barnes).—Sown 15th December, 1906. Result: Good. I consider this a profitable mealie to grow, giving a heavy yield. Each stalk only bears one cob, but this is of large size, and the grain is long. The stalks were from 7 to 8 feet in height. This mealie gave a yield of 125 lbs from 1½ lbs. sown.

Aliwal North (Mr. C Dorrington).—Sown 11th December, 1906. Result: Good. I certainly think this mealie will pay, but it should be sown earlier The return was excellent, 400 lbs. from the 2¼ lbs. sown.

Cradock (Mr. J. B. Van Heerden).—Sown 8th December, 1906. Result: Good. This mealie is both suitable and will pay in this district. Yield . 330 lbs. from the 3 lbs sown, which was remarkably good seeing that the crop was very much damaged by a hailstorm and subsequently by locusts.

Graaff-Reinet (Mr. F. J. Haarhoff).—Sown 10th January, 1907. Result: Good. I consider this a very good mealie, suitable to the district, and deserving further attention.

Clanwilliam (The Rev. Mr. G. Smolke).—Sown 15th December, 1906. Result: Fair. Sown thickly in drills on irrigated land. Reaped 15th March, 1907. Yield: 14—1. Suitable, and will pay in this district. I do not consider one trial sufficient before expressing an opinion on it. So far it has given satisfaction and inducement for another trial.

Pedric's Perfected Golden Beauty.

The consensus of opinion with regard to this mealie seems to be that while not otherwise superior to the commonly cultivated German Yellow variety it yet possesses one great advantage over that old favourite of being considerably earlier in maturing. It seems to do best if sown late when the weather is warm. There are very few adverse reports, whilst many experimenters speak of it in terms of the highest praise. Only in the Western Province can it be said not to have succeeded generally. Evidently sowing at wide distances is to be recommended, 40 to 48 inches apart. This mealie seems to need good treatment, especially as regards water. In order to enable farmers in all localities where the mealie has been tried to judge for themselves the following reports, of which 72 have been received, are attached; of these 42 are distinctly favourable and only 8 find it undesirable.

Kuruman (Mr. G. Barnard).—Sown 3rd January, 1907. Result: Good. Sown broadcast and thinly on unirrigated land. Destroyed by locusts during last week of February, 1907. Only about 2 per cent. left. This district is a late one for unirrigated crops, as rain seldom falls before January, and, owing to early frosts, sowing is only possible in this month. This mealie made quite the best growth of any I have seen in this district, and was carrying 3 to 4 pods to each stem. It is quite as drought-resisting as any of the local varieties, and undoubtedly a heavy cropper. The few stools remaining are not quite ripe yet; I should say that they take 90 to

100 days to ripen from date of sowing I consider it a very suitable mealie for the district.

Taungs (Mr. C. T. Hawley).—Sown 15th December, 1906. Result: Good. Sown in drills on irrigated land. I feel sure they will do well here; a great improvement on our other mealies and far superior in growth. Unfortunately locusts destroyed my crop.

Herbert (Mr W. H. Wayland). -Sown 14th November, 1906 Result: Fair. Sown thinly in drills on irrigated land. Reaped during March. Yield: 23⅓—1. Greatly damaged by corn crickets. They attack the cobs from the beard downwards and destroy fertility. I consider the amount of mealies reaped was only about a fourth of what the yield should have been under more favourable circumstances. They suffered from want of water, from the ravages of locusts and, worst of all, from the attacks of the corn-cricket I don't care much for mealies with flat grains. I prefer the round, hard full grain I should say it was suitable, and will pay as well as the ordinary Cape Yellow in this district.

Herbert (Mr. J. Cawood) —Sown 18th December, 1906. Result: Good. Came up splendidly, but was eaten by locusts when about two weeks old. Only a few left.

Vryburg (Mr. George Musson).—Sown: No date given. Result: Good. Were eaten off by locusts when about 1 inch, and then came up again. Never recovered themselves properly, and I only reaped 50 lbs I consider this the best mealie, and intend keeping seed for season

Middelburg (Mr. H. E Trollip).--Sown 15th September, 1906. Result: Good. Sown thinly in drills on irrigated land. Regret that this promising crop was destroyed by severe hailstorm on 6th February, 1907. This mealie is a very rapid grower, and promised a good yield Was carrying from 5--6 cobs. I can strongly recommend it in these parts

Middelburg (Mr. J M Grey, Roodehoogte) Sown 26th September, 1906. Result: Good Sown thinly in drills on irrigated land. Seed germinated badly (owing perhaps to early sowing in frosty weather or grub in the ground), but judging by the few plants growing it is a very robust mealie Stalk growing 10 feet high in good soil Cob large, with very fine grain Very suitable for ensilage. Crop still standing

Aliwal North (Mr. M. P Potgieter) - Sown 15th November, 1906. Result. Good Sown broadcast on irrigated land. Reaped 20th March, 1907. Yield: 133⅓—1. I consider it suitable, and will pay in this district

Queenstown (Mr. S. McConel).—Sown 21st September, 1906. Result: Excellent. Sown very early for this district, in drills thinly on irrigated land. Reaped February, 1907. Yield: 200 lbs from 3 lbs sown. Eaten by grub when coming up. I consider this mealie is the best of all the varieties I have tried. It grows in stools of 4 or 5 stalks with 1 or 2 cobs on each. Grain plump and heavy.

Queenstown (Mr. G A P. Price). - Sown 15th November, 1906 Result: First-class. Very suitable to district, and will pay if only the locusts will leave it alone. Slightly attacked by worms on the stem Eaten by locusts on the 6th March, 1907.

Queenstown (Mr. W H. Bartlett) --Date not given Result: Good. Yield: 255 lbs. from 3 lbs. sown; 3 lbs. of German Yellow mealies sown alongside yielded 304 lbs., but the Golden Beauty was 30 days earlier than all ordinary yellow mealies, besides being a good cropper and, in my opinion, of excellent quality. Being 30 days earlier is a great consideration in time of drought, and also admits of another crop being sown on the same land.

Dohne (Mr. J. Apel).—Sown middle of September. Result: Indifferent. Sown thickly in drills on unirrigated land. Reaped March, 1907. Yield: 50—1. Mealie grub noticeable when plants were 2 feet high.

Middledrift (Mr. E. Burt).—Sown December. Not reaped. Cannot give an opinion.

King William's Town (Mr. R. A. H. Pritzkow).—Sown 1st December. Result: Good. Sown in drills on unirrigated land. Reaped 20th April, 1907. Will do well and should pay, but must be sown in November. Weather very unfavourable, continuous rains. Attacked by grubs just before coming into flower.

East London (Mr. R. Bryson).—Sown 10th October. Result: Good. All mealies do well here if they get enough rain. This year was good for early mealies. Cut 19th February. Yield: 37½—1.

Bedford (Mr. W. J. Mapham).—Sown 29th October. Destroyed by grubs. Will report next season on the few remaining plants.

Alice (Mr. G. E. Matthews).—Sown October, 1906. Attacked by small grub when 6 inches high, and eaten by locusts when grain was forming. Reaped March, 1907. Yield: 2½—1.

Adelaide (Mr. W. Pearson).—Sown 24th October, 1906. Result: Good. Sown broadcast and thickly on irrigated land. It gives a good yield and stands drought well, besides being an early mealie for the size. I think it suitable, and will pay here. Attacked by locusts in February, 1907.

Alexandria (Mr. O. B. Sangster).—Sown middle September, 1906. Result: Good. Very suitable provided sufficient rainfall. A crop of these mealies would be more profitable than many others. Yield well from the cob- two muid bags of cobs producing a full bag of grain. Reaped 18th March (quite dry). Yield: 62⅔—1.

Cathcart (Mr. W. J. Elston).—Sown 24th September, 1906. Result: Very good. I consider this mealie most suitable for the lower Thomas River farms. A very good drought resister. I feel sure it will pay well in this part of the Cathcart district. Cobs 12- 15 inches in length with well-filled rows. Other mealies attacked by smut very badly. Golden Beauty was not attacked by smut or grub of any description.

King William's Town (Messrs. Robinson and Roberts).—Sown 26th November, 1906. Result: Bad. Sown thinly in drills on unirrigated land. Germination bad. No crop as it was very dry, and the mealies are now hopelessly dried up.

King William's Town (Mr. H Stratford)—Sown 3rd November, 1906. Result: Bad. Sown on unirrigated land, in drills. Not suitable, and will not pay. A quick grower, but took blight a few days after flowering. Reaped 4th March, 1907. Yield: 20—1.

East London (Mr. James Hement).—Sown: No date given. A complete failure. Do not know the cause.

East London (Mr. A. Bussey).—Sown 20th October. Owing to flood and ground crusting afterwards seeds did not come up.

Port Alfred (Mr. E Parker) Sown 15th September, 1906. Destroyed by grub.

Salem (Mr. R. A Long).—Sown September, 1906. Result: Good. Sown in drills on unirrigated soil. I consider this variety suitable for district. Eaten a little by small grub Reaped February Yield: 33⅓- 1

Albany (Mr S Rippon) Sown 20th October, 1906 Result. Good This mealie is both suitable and will pay in this district

Trappes Valley (Mr Job Timm). Sown 1st October, 1906 Result Fair. Sown in drills on unirrigated land Reaped end of February 1907 Yield: 5—1 Owing to severe drought grain was shrivelled and light. With good rains I consider this mealie suitable, and will pay in these parts I intend planting early and in harder soil in future.

Grahamstown (Mr Jesse Long) Sown 2nd October, 1906. Result Good Sown thinly in drills on unirrigated lands. Reaped end of March, 1907 Yield: 73⅓—1. Seed grew and yielded excellently, returns grains ben[illegible] [illegible]uch finer than the seed received, viz., as to size Do not think it better than our ordinary seed known locally as "German Yellow" Will pay well with favourable weather.

Trappes Valley (Mr. Jas. W. Lister).—Sown October, 1906. Result: Poor. Sown thinly in drills on unirrigated land. Reaped 15th March, 1907. Yield: 40—1. Very doubtful, and don't consider it will pay in this district.

Trappes Valley (Mr. Owen Timm). Sown 13th November Result: Poor. Sown in drills 2 feet by 5 feet on unirrigated land. Reaped end of April. Yield: 24 4-15ths—1. This crop did not do so well as it was very dry when it began to flower.

Highlands (Mr. F. S. Tuberville).—Sown September, 1906. Result: Poor. This mealie did not come on well. Crop very poor. Reaped March, 1907.

Highlands (Mr. A. G. Daniell).—Sown 20th October, 1906. Sown thinly and broadcast on unirrigated land. Most destroyed by grub. I consider it will pay in this district, as it comes up well.

Highlands (Mr. R. E. Roe).—Sown 13th November, 1906. Result: Fair. Destroyed completely by caterpillars or grubs as soon as they came up. Suitable for district if not destroyed, and should pay.

Port Elizabeth (Mr. J. A. Gordon).—Sown 27th October, 1906. Result: Good. Sown broadcast on irrigated land. Would do better on a heavier soil, and if they had one more lot of watering. I consider it suitable as it ripens quickly and gives a good yield. I have mealies that are equally good, but do not ripen so soon. Reaped 20th February, 1907. Yield: 133⅓—1. Slightly attacked by worm.

Alexandria (Mr. R. F. Smith).—Sown 15th August, 1906, and 28th October, 1906. Result: Good. Suitable, and will pay in this district. A very good mealie, and should give a heavy yield. That sown in August destroyed by ladybirds. The 2½ lbs. sown in October on unirrigated land was reaped 26th March, 1907, and gave a yield of 235 lbs.

Port Elizabeth (Mr. A. Jones).—Sown 11th September, 1906. Result: Good. Sown in drills thinly on unirrigated land. Reaped 3rd February, 1907. Regret cannot give yield as crop was practically destroyed by baboons. The few cobs remaining are good specimens and well filled.

Addo (Mr. G. Coetzee).—Sown 15th September, 1906. Result: Good. Hand-planted on irrigated land. Reaped 5th February, 1907. Yield: 175 lbs. Weather rainy first three months, then very hot and dry. The Golden Beauty is a very good class of mealie, but is not a drought resister. Requires water at regular intervals. It is especially noted for its sweetness as a green mealie and, in my opinion, if planted in January on good soil will be very early. I am retaining my full result for seed. I would suggest this mealie be planted in December when possible. Very suitable to district, and will pay handsomely.

Alexandria (Mr. J. L. Smith).—Sown August, 1906. Result: Fair. Thickly sown in drills on unirrigated land. Grew well until attacked by ladybirds, which destroyed the greater part of my crops. Not reaped.

Uitenhage (Mr. J. H. Rogers).—Sown 15th September, 1906. Result: Excellent. I consider this mealie very suitable for district, and will pay well. It is a rapid grower and heavy cropper—most of the stalks carried two mealies. I am exhibiting this mealie at the Port Elizabeth Show for the benefit of other farmers desirous of growing it.

Carlisle Bridge (Mr. P. J. Norden).—Sown early October, 1906. Result: Excellent. Sown thinly on irrigated land, both broadcast and in drills. Reaped 28th March, 1907. Yield: Not stated. I consider it a very suitable mealie for this district, and will pay. It is a beautiful yellow, with a very large cob. I am keeping seed for next season.

Steytlerville (Mr. M. W. Walton).—Sown December, 1906. Sown broadcast on irrigated land. Reaped end of March. Yield: 20—1. My opinion is that this seed might improve at next sowing. Am not sure if it is suitable for district. Slightly attacked by locusts.

Hankey (Mr. E. W. Kirby).—Sown 15th September, 1906. Result: Excellent. Sown in drills 4 feet part on unirrigated land, about three weeks too late for this district. Reaped 10th February, 1907. Yield: 216⅔—1. Slightly injured by stalk-borer; damage not more than 2 per cent. I consider this mealie very suitable, and will pay. It is undoubtedly one of the best, and under irrigation will yield enormous crops. Grain is a bright golden and heavy. Foliage rather dense. Should be given plenty of room, the drills being not less than 4 feet apart.

Riversdale (Mr. M. L. Le Grange).—Sown 30th September, 1906. Result: Excellent. Sown in drills 3 feet by 3 feet on unirrigated land. Reaped March, 1907. Yield: Not stated. I consider it one of the best for this district. The ears are 11—13 inches long. Flood destroyed most of crops.

Wynberg (Mr. H. Cloete).—Sown early September, 1906. Result: Good. Sown in holes 3 feet square apart on irrigated land. Reaped end of February. Yield: 133⅓—1. A good grower and cropper. The only objection that I have to it is that it is too long in the stalk. This mealie suffered tremendously with the high winds we had in December, many plants being blown down and destroyed.

Caledon (The Rev. Mr. J. G. Wedeman).—Sown 7th September. Result: Good. Suitable, and will pay in this district. Cut 15th February, 1907. Yield: 44⅔—1.

Caledon (Mr. C. Lange, Gloria).—Sown 1st December. Suitable as green fodder only. Did not come to maturity owing to drought. Would have been a fine crop had the mealies been watered.

Bellville (Mr. C. W. Duminy).—Sown August, 1906. Result: Good. Sown in drills on irrigated land. Consider it very suitable for district, and will pay as a green fodder. Growth remarkably good. Thinned for cattle food in November and December, 1906. Yield: Small (mostly used for cattle). Larks destroyed a good many of the young plants.

Malmesbury (Mr. M. J. de Villiers, Mamre).—Sown September. Faster growing than the Cape mealie, but stalks appear to be of a very poor nature, and return in mealies very poor also. Attacked by insects in November or December. Not suitable for this district.

Paarl (Mr. A. H. Schmidt).—Sown 1st October, 1906. Result: Poor. This mealie is too slow, and takes a long time to ripen. Don't like it for further use.

Malmesbury (Mr. L. C. F. Smith, Klipheuvel).—Sown 1st September, 1906. Result: Fair. Sown thinly by hand. Reaped 15th March. Yield: Not given. Consider it will pay in this district.

Malmesbury (Mr. A. J. de Villiers, Kalabas Kraal).—Sown 26th August, 1906. Result: Poor. Hand-sown in rows on unirrigated soil. May do better on damp soil. Reaped December, 1906. Yield: Not known.

Stellenbosch (Mr. W. C. Winshaw).—Sown: No date given. An insect resembling a ladybird finished off the crop as soon as it showed above ground.

Hex River (Mr. P. J. Jordaan).—Sown 10th October. Result: Fair. I consider it suitable to district, and will pay. Yield: 60—1. Attacked by the mestworm about end of October.

Rawsonville (Mr. N. H. Lindenberg).—Sown 15th September, 1906. Result: Fair. Fairly suitable for district, and will pay. Reaped 20th March. Yield: 58½—1.

Albert (Mr. A. J. Fourie).—Sown 18th September, 1906. Result: Good. Very suitable for this district, and I can recommend it. Reaped 1st March, 1907. Can't give the yield at present.

Cookhouse (Mr. J. E. L. Burchell).—Sown 22nd October, 1906. Sown broadcast on unirrigated land. This is not a hardy mealie, and I don't consider it suitable for this district. No yield.

Jansenville (Mr. J. H. Fourie).—Sown th November, 1906. Result: Fair. Sown broadcast and thinly on irrigated land. Reaped 13th February, 1907. Yield: 35—1. Most of crop was destroyed by mestworm. Will not pay in this district.

Somerset East (Mr. J. M. L. Wessels).—Sown November, 1906. Result: Good. This mealie ripened 20 days earlier than did the O.R.C. "Bushman" variety, and is both suitable to this part and will pay, and I will continue to grow some.

Tembuland, Clarkebury (Mr. E. D. Clarke).—Sown 22nd November, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Reaped 5th April, 1907. Yield: 30—1. Attacked by locusts. Not suitable, and will not pay in this district. A very strong grower with large cobs containing as much as 600 grains on one cob. When dry cobs stand up on stem and water lodges and rots the grain in the wet weather.

East London, Reeston (Mr. A. G. Randall).—Sown 12th October, 1906. Plants grew to about 3 feet when they were attacked by small worms which entered at the top of the plants. A few came to the flowering stage, but were all so badly eaten by worms that I did not get a single mealie. The German yellow mealie does much better. From experiment I don't think it suitable for this district. I should like someone else to experiment before I give a definite opinion.

Stutterheim, Bolo (Mr. S. Ollis).—Sown 24th October, 1906. Sown in drills. A quick grower, and looked quite healthy until the hail completely destroyed it.

Tembuland, Elliot (Mr. P. J. de Wet).—Sown 10th October, 1906. Result: Poor. Sown broadcast on unirrigated soil. I consider it suitable under more favourable conditions, and should pay well. Too much rain. Did not reap.

Tembuland, Elliot (Mr. P. Osborne).—Sown 10th October, 1906. Result: Good. Yield: 126 lbs. from 3 lbs. sown. A heavy yielder and strong grower; yield would have been even better but for the heavy rains and attack of the mealie borer.

Umtata (Mr. A. V. Mellor).—Sown September. Result: Bad. Utterly ruined by ordinary mealie worm caused by excessive rain. It looked well when green. Should like to make a further trial, as I consider it will pay in this district.

Snow White Dent.

This is a mealie with a great reputation in America. Out of 93 reports received 28 only were favourable, and about the same number condemned it; while a dozen trials were brought to nothing by hail and locusts, and the remainder were of a negative description. Under these circumstances the mealie does not seem so suitable as others already mentioned, and only a selection of the favourable reports are published. This variety is a tall and somewhat slow-growing mealie, not well able to withstand unfavourable conditions. It is tender and soft and much injured by surface caterpillars and other insects. The open tip leaves it exposed to ravages of birds, and on the whole it may be regarded as inferior to other varieties tried. In its favour the following accounts are given:—

Lady Frere (Mr. John Elliott).—Sown about October. Result: Good. Sown broadcast on irrigated and unirrigated land. Considered rather early for sowing in this district. I consider this mealie will pay handsomely, especially where the lands can be irrigated. I am sending you three samples of the mealie in different stages of growth, and will later on send you some ripe cobs. You will notice that there are 16 rows of mealies on the cobs, and the cobs are very big, this with the large grain should give a splendid return to growers. I have had much better samples on the table for the last three weeks in the shape of green mealies. Although

not as sweet as the 'eight row" or the Maizena or six-weeks mealies, they make very fair eating green, moreover, they can be used from a very early stage green. Those dependent on the rain have not thrived as well, although there were very fair rains. Unfortunately, we had some severe storms, followed by excessive heat, which clogged the ground and caused a lot of seed to rot, and some did not come up. Will reap about end of February.

Albert (Mr. S. J. Strydom).—Sown 28th October, 1906. Result: Good. I can recommend this mealie, and will pay well in this district. The only drawback is, I don't fancy it is drought resisting. Reaped 15th March. Yield: 66⅔—1.

Cookhouse (Mr. J. E. L. Burchell).—Sown 22nd October, 1906. Result: Good. Sown broadcast and thinly on unirrigated land. Reaped 8th March, 1907. Yield: 50—1. Slightly attacked by grubs. Suitable, and will pay as well as any others I have tried.

Goudini (Mr. W. D. van der Merwe).—Sown 1st November, 1906. Result: Good. Sown in drills 1½ by 3 ft. on irrigated land. Reaped April, 1907. Still in stalk. A good grower and a good bearer. Suitable for district, and intend sowing again next season.

Barkly West (Mr. C. H. Virtue).—Sown 3rd December, 1906. Result: Good. Planted thinly on irrigated land. Reaped 25th March, 1907. Yield: 48—1. Suitable for district, and will pay, having a very heavy crop.

Alexandria (Mr. John Everton).—Sown 22nd October, 1906. Result: Good. Sown in drills on unirrigated land. Reaped 12th January, 1907. Yield: 106⅔—1. Suitable for early sowing and will pay as a poultry food. Also sown on 22nd December, 1906. Started well, but owing to drought came to nothing. Sown again in February, 1907; did not answer. The October sowing sprouted, some plants bore nine heads, the subsequent sowings only one head.

Trappes Valley (Mr. Milton Timm).—Sown 6th November. 1906. Result: Fair. Sown in drills 2 feet by 5 feet on unirrigated land. Reaped end of April, 1907. Yield: 24⅔—1. This mealie is suitable for district, but will not give the yield that our old White Horse Tooth mealie does. Pays fairly well.

Richmond (Mr. A. P. de Villiers.)—Sown October, 1906. Result: Good. I think that this mealie is both suitable and will pay in this part. The grain is closer on the cob than that of the old mealie.

Early Yellow Canada.

For those desiring a small yellow mealie similar to that imported from Argentina, for which a considerable demand exists, this mealie was suggested. Although only 10 out of 24 reports to hand are encouraging, yet only 3 are quite unfavourable, the remainder being negative or indifferent. Further trial is certainly warranted.

Caledon (Mr. J. J. de Villiers).—Sown 10th September, 1906. Result: Good. Sown rather thickly in drills on irrigated land. Quite satisfactory, and will pay well. Does not grow to such a height as other varieties, is inclined to stool, and yields well. Owing to its early maturing, it is practically free from grubs (if picked in time) Cobs generally well filled. Reaped January, 1907.

Stellenbosch (Principal, Elsenburg).—Sown October, 1905. Result: Good. A good early mealie. Yield: Three tons per acre. Cut green.

Goudini (Mr. D. S. Botha).—Sown 20th December, 1906. Result: Good. Sown thinly in drills on irrigated land. Reaped 20th May. Suitable, and will pay. A good mealie, only takes three months to ripen.

Wynberg (Mr. H. Cloete).—Sown early December, 1906. Result: Bad. Sown in holes 3 feet square on irrigated land. Reaped end of March. Yield about 5 lbs. from 3 lbs. sown. Seed was very bad, and only a few germinated. No good for a crop. A stunted grower. I cannot recommend it.

Robertson (Mr. P. W. Marais).—Sown 20th December, 1906. Result: Poor. Sown thinly in drills on irrigated land. Not reaped. Maize worm destroyed while the small maize came out. I consider it suitable for district, but rather too small.

Riversdale (Mr. J. W. Smalberger).—Date not given. Failed owing to lateness of sowing, and excessively wet season.

Oudtshoorn (Mr. O. Scholtz).—Sown 20th December, 1906. Result: Good. This mealie is both suitable and will pay in this district, but it should be sown earlier.

Uitenhage (Mr. P. Heugh).—Sown 21st December, 1906. Mealies grew well until they were destroyed by locusts. I still have a small quantity of seed, and will sow same in September, and report later.

Berlin (Mr. W. Page).—Sown 10th December, 1906. Result: Fair. Sown rather thinly on irrigated land, behind plough. Reaped 20th March, 1907. Yield: 2 1 5th—1. Suitable for district, but will not pay as a main crop. Attacked by mealie grub and much damaged. Will do well as an early mealie.

Carlisle Bridge (Mr. P. J. Norden).—Sown early February. Result: Good. Planted in drills thinly on irrigated land. A very early mealie. Not reaped yet. Attacked by rust. Suitable, and will pay in this district

Komgha (Mr. W. A. Edmonds).—Sown 22nd December, 1906. Result: Bad. Unsuitable for this district. After growing to about 2 feet, all withered or died away.

East London (Mr. G. Elliott).—Sown 30th November Result: Failure. Took yellow rust and died when about 12 inches high. I don't consider it suitable to district, considering that the ground they were planted in is reckoned the best soil for mealies in my district. Growth very slow.

Queenstown (Mr. W. J. Marshall).—Sown 14th December. Not suitable for this district, and don't consider it will pay. Failure owing to hailstorm. Sown too late for this district.

Queenstown (Mr. R. Barnes).—Sown 15th December, 1906. Result: Good. This mealie will pay, and is very suitable to the district, and I consider it well worth growing. These mealies grew from four to ten stalks from each grain, only three or four of these, however, bearing cobs. The yield obtained was 70 lbs. from the 1½ sown.

East Griqualand (Mr. W. Calder Potts).—Sown 10th December, 1906 Result: Failure. Sown broadcast on unirrigated land. Grew well until attacked by mealie stalk borer. Few cobs that formed were destroyed by this grub.

Richmond (Mr. J. G. Hauptfleisch).—Sown 20th December, 1905. Result: Good. This mealie is both suitable, and will pay in this district. It is very early that it can be grown on farms with a limited supply of water. It yields well and is of a fine flavour.

Vryburg, Brussels Siding (Mr. W. H. Edmunds)—Sown 30th December, 1906. Result: Good. Sown thickly 1½ lbs. broadcast and 1½ lbs. in drills 3 ft. by 3 ft. on unirrigated land. Reaped 25th March. Yield: 49⅓—1. Slightly damaged by locusts when 3 inches high, also by a large grub when cob was green. I consider it very suitable for this district, and will pay. This mealie is a quick grower, but has a tendency to fall over in heavy rains. Should recommend planting in drills 2 feet 6 inches apart It throws out about eight or nine stalks, which should be cut away, leaving only three. Cutting and topping too much allows the sun to dry up the surface moisture too soon. Sown broadcast did not answer nearly so well, and gave more trouble in cleaning.

Vryburg (Mr. F. Johnstone)—Sown 15th January, 1907—Sown broadcast and thinly on unirrigated soil. Suitable for district, but unfortunately destroyed by locusts.

Vryburg (Mr. D. Robertson).—Sown 14th January, 1907. Result: Excellent. Well adapted for this district. Were in full flower, and cobs forming also. All stooling well in the beginning of March. A very valuable mealie.

Kuruman (Mr. E. Wayland)—Sown 20th December, 1906. Result: Good. Sown thinly in drills on irrigated land. This mealie is as suitable to this district as any other variety of yellow mealie, only not so good as of the ordinary kind of Cape yellow mealies Locusts destroyed all before mealies were thoroughly ripe. Cannot state yield.

THOROUGHBRED WHITE FLINT.

This mealie has done fairly well, but like all of its complexion is less popular than the yellow mealies. Fourteen reports are in its favour, six to the contrary, ten failed through accident of flood, drought, grubs or locusts. The following is the experience of those who have tried it:—

Paarl (Mr. P. J. Hugo).—Sown December, 1906. Result: Good. A heavy cropper, does not grow too high, bears two or three cobs on each stalk, some other varieties might give more green forage, but not in yield of dry mealies.

Stellenbosch (Mr. J. H. Eckard).—Sown 24th December, 1906. Result: Good. Grew well and will pay, gives plenty of feeding during the summer months. Seed should be sown two months earlier.

Goudini (Mr. D. S. Botha).—Sown 20th December, 1906. Result: Good. Sown thinly in drills on irrigated land. Reaped 10th April, 1907. Yield not weighed. A quick grower and suitable for district.

Caledon (Mr. J. S. le Sueur).—Sown 15th December, 1906. Seed germinated but was killed by excessive rains. Was sown rather late for this district.

Knysna (Mr. R. Cowley).—Sown October, 1906. Result: Bad. Sown broadcast on irrigated land. Reaped beginning of March. No yield. Attacked by grubs. Not suitable.

Kuruman (Mr. E. Wayland).—Sown 20th December, 1906. Result: Excellent. Sown thinly in drills on irrigated land. I consider this mealie as fine a sample of white mealie as in the country, and if planted on a large scale will pay handsomely.

Vryburg (Mr. D. Robertson).—No date given. Seed did not all germinate. What did come up seemed a good bearer, but I think rather late for this part. Totally destroyed by locusts.

Mafeking (Mr. J. W. de Kock).—Sown November, 1906. Result: Fair. Sown broadcast and thinly on unirrigated land. Not so suitable for this district as White or Yellow Hickory King or any of the late Bread mealies. If soil is well cultivated and manured this variety will pay.

Mafeking (Mr. E. Bulleid).—Sown 28th December, 1906. Result: Bad. Only a few plants survived the attacks of the locusts, and not any of these made a good growth. I do not think this mealie is suitable, nor will it pay in this district.

Graaff-Reinet (Mr. F. J. Haarhoff).—Sown 23rd December, 1906. Result: Good. This mealie is both suitable and will pay in this district, and decidedly deserves attention.

East Griqualand (Mr. W. Calder Potts).—Sown 10th December, 1906. Sown broadcast on unirrigated land. Grew well until attacked by mealie grub, and totally destroyed.

CINQUANTINO MEALIES.

A great number of applications were made for this mealie, as it had been claimed to be a dwarf variety remarkable for its early maturity. Many applicants appear to have overlooked the first-mentioned attribute and expected a mealie not only growing much faster than most, but of equal size and yield. Objection is accordingly often taken to the small size of the grain, and it is reported as being stunted in appearance. It is naturally a small mealie—the smallest—and has for this reason special value as a feed for fowls and ostrich chicks, though it is also highly spoken of for horses, cows, and for green forage; also as a table mealie. Its rate of growth has varied very much according to time of sowing. It is generally spoken of as of no commercial value, yet in view of its adaptation for special purposes it ought to be saleable to those who want such a grain, especially for poultry and the table. It is by no means a general-purpose mealie, and as it has such a short season in which to mature it requires good soil, warmth and moisture. It is without doubt the most rapidly-maturing mealie we have, but 90 days is its usual requirement, not 50, as its name would indicate. There have been a singularly large proportion of failures by misadventures such as drought, flood and locusts—52 out of 158 trials—attributable to the fact that so often Cinquatino mealies were sown out of the season. Of the remainder, 60 may be written down as successes, 16 failures, and the rest intermediate. Under these circumstances Cinquantino mealies may certainly be recommended to anyone desiring a rapidly-maturing mealie suitable for early green feed or for green mealies for poultry and ostrich chicks. It does not occupy the land long. Its small size is not to be considered a demerit, but rather as a peculiar property to be taken advantage of where possible. In view of the above details and owing to the large number of reports received, only a selection need here be given:—

Bellville (Mr. C. W. Duminy).—Sown August, 1906. Result: Good. Suitable, and will pay as a fodder. Stalks thin and succulent. Seed being small, makes a better food for poultry than other varieties. Mature much earlier than any other although sown at the same time.

Stellenbosch (Mr. J. H. Eckard).—Sown 5th December, 1906. Result : Good. This is a very good, small, prolific, early maturing mealie, and will pay in this part; crop damaged by severe storm.

Paarl (Mr. P. J. Hugo).—Sown November, 1906. Result : Good. This crop will pay to grow as an early spring fodder, to be cut green. Later varieties will pay better for the main crop, giving a heavier yield.

Koelenhof (Mr. W. van der Byl).—Sown 18th December. Result : Good. Did very well, but in this district should be sown about 10th October, and treated as a garden crop.

Caledon (Rev. J. G. Wedemann, Genadendal).—Sown 7th September. Result : Good. Reaped 15th February. Yield : 26½—1. Suitable, and will pay in this district.

Piquetberg (Mr. D. J. Perold, Twenty-four Rivers).—Sown 30th September. Result : Good. My opinion is that it will pay in this district for the following reasons : You can reap it twice a year, which you can't do with other mealies. It yields a good crop, 37½—1. Cut late in December.

Burghersdorp (Mr. Gideon Joubert).—Sown end October. Result : Good. Every farmer should have some of these mealies, although the yield is less per acre than bread mealies. They are early, and when it is too late for other mealies these can be sown. Reaped early March. Yield : 217—1.

Molteno (Mr. W. H. Tapson).—Sown 20th October, 1906. Result : Good. Suitable to district, and will pay. Reaped 26th March, 1907. Yield : 100—1.

Aliwal North (Messrs. Sweetman Bros.).—Sown 17th October, 1906. Result : Good. Suitable, and will pay in this district. They grow well, ripen in about three months, and give a good yield. Reaped 20th March, 1907.

Fraserburg, Riet Vlei (Mr. F. W. Odendal).—Sown 30th October. Result : Good. Answers very well. Distributed yield to other farmers. Reaped 30th January, 1907. Yield good.

Molteno (Mr. A. Francis).—Sown 16th October. Result : Good. A quick grower, but very small cob and grain. I consider it a suitable mealie for district, but not a profitable one to grow.

Kuruman (Mr. G. Barnard).—Sown 15th October, 1906. Result : Fair. This mealie stools well and could be sown thicker than 2 ft. by 2 ft. Reaped 18th December, 1906. Yield : 28—1. Will be very useful where the crops are destroyed in the early stage of growth, owing to its quickness in maturing, but don't consider it suitable as a main crop.

Aliwal North (Mr. F. G. Fouché).—Sown 1st October 1906. Result : Good. Sown broadcast and thickly on irrigated land. Reaped February. Yield : 41¾—1. Very suitable, and will certainly pay. I consider it an early mealie, although it took four months to ripen.

Vryburg, Dingle (Mr F. B Ayton).—Sown 16th November, 1906. Result : Good. Sown broadcast on unirrigated soil. Reaped 15th March. Yield about 200 lbs., not shelled yet, from 1½ lbs. sown. Suitable for a late season. Attacked by corn krick and locusts when maturing.

Mafeking (Mr. J. W. Brodie).—Sown 12th November, 1906. Result : Good. Sown thinly and broadcast on unirrigated land. Reaped 12th January, 1907. Yield : 33¼—1. Suffered much from drought, hence the small return, also eaten by locusts at an early stage. Intend sowing all I reaped next season. A good little mealie with a very full cob. A quick grower and very hard.

Burghersdorp (Mr. A. P. van Plotzen).—Sown 14th November, 1906. Result : Good. Sown broadcast and on irrigated land. Reaped 15th February, 1907. Yield : 66¾—1. Suitable for district if sown on good land, and will pay under irrigation. Cob rather small, but the quantity of grain from each fairly good. Can recommend it for district.

Victoria West (Honourable H. J. H. Claassens).—Sown 20th November, 1906. Result : Fair. Sown broadcast and thinly on irrigated land. Reaped 1st March, 1907. Yield : 8—1. Seed germinated badly. It is an early mealie and sweet, but too small. I don't think it will pay, as a much larger mealie can be planted on the same dimension of land, and will certainly yield more. Very suitable to district, and grows well.

Middelburg, Roodehoogte (Mr. J. M. Grey).—Sown 26th September, 1906. Result : Fair. Sown on irrigated land on furrows behind plough. The most rapid mealie in maturing, and most suitable for high parts where the summer is short, but unsuitable for ensilage owing to stunted growth. A poor cropper, and grain small and unsatisfactory. Only suited to this district when very late sowing is necessary. Not reaped yet.

Barkly West (Mr. Chas. H. Virtue).—Sown 3rd December, 1906. Result : Good. Planted thinly on irrigated land. Reaped 8th March, 1907. Yield : 32—1. Stands drought well. Every plant bears two cobs. Suitable for district, and I think it will pay to sow large quantities for feeding poultry.

Aliwal North (Mr. C. Dorrington).—Sown 21st December, 1906. Result : Good. Sown thinly and broadcast on irrigated land, very late for district. Reaped 20th April, 1907. Yield : 64 2-7ths—1. I do not consider this very small mealie suitable for commercial purposes, but as food for fowls it is excellent, also if cut early and fed to cows during winter, which is pretty severe up here. The return most satisfactory, especially as on one or two occasions flood water swept many away.

Kuruman (Mr. E. Wayland).—Sown 20th December, 1906. Result : Good. Sown thinly in drills on irrigated land. I cannot give the yield as the locusts visited us before the mealies were ripe. I consider this mealie, if thoroughly grown, splendid for poultry and for horses. It is small and not too hard As suitable for district as any other mealies, and ought to pay.

Victoria West, Biesjespoort (Honourable W. Ross) —Sown early September Result : Good. This mealie should do splendidly up here. Bore well until destroyed by locusts. Some of the plants have six or more cobs on. The mealie, however, is rather small. My neighbours think very highly of it

Riversdale (Mr. J. J. van Wyk) —Sown 28th December, 1906. Result : Good. Sown broadcast and thinly on unirrigated land. I think this mealie a very suitable one to sow as a catch crop after oats, barley and wheat. It grows very quickly and resists drought well. Reaped 10th April, 1907. Yield : 50—1.

Alexandria (Mr. R. T. Smith) —Sown 15th August, 1906. Result : Good. Sown fairly thickly on unirrigated land. That sown in August completely destroyed by ladybirds in November. The remainder sown in October, 1906, was reaped on 20th February, 1907, and yielded 84—1. Should answer well anywhere in the district, and will pay as a poultry feed.

Carlisle Bridge (Mr. P. J. Norden).—Sown early October, 1906. Result : Good. Sown broadcast and thickly on irrigated land. Reaped end of January. Yield : 133⅓—1. Suitable, and will pay. Splendid for poultry and ostrich chicks.

Addo (Mr. G Coetzee).—Sown 28th September, 1906. Result : Good. Sown broadcast on unirrigated land. Reaped 10th January Yield : 100 lbs. Weather rainy. I cannot recommend this mealie with confidence for marketing purposes, as I do not know if there is a demand for same, but there is no doubt as to its productiveness, and should be extensively cultivated in agricultural districts where rain falls at regular intervals. Excellent for chickens and other small birds. I am keeping all mine for seed. Suitable to district, but will only pay on irrigated lands.

Port Elizabeth (Mr. Robert Nance).—Sown 20th August, 1906. Result : Good. Sown in drills 6 inches apart on unirrigated land. Kept well hoed, but not thinned out. Reaped 26th December, 1906 Weather, too much rain. Applied kraal manure. I consider it suitable for district, and would pay if labour were cheaper. Would always command a ready sale for poultry food.

Toise River (Mr. W. J. Elson).—Sown 24th September, 1906. Result : Good. This mealie cannot be beaten as a fodder plant. Would be a grand mealie for poultry farmers. For commercial purposes I do not consider it would pay. Mealie smut appeared on a lot of the stalks. Stools splendidly.

Fort Beaufort (Mr. I Mildenhall).—Sown 16th September. Result : Good. I consider this mealie suitable to district, and will pay. Yield : 100—1. Will not do on poor soil. Some were destroyed by locusts. These mealies are very small, but very productive, and ripen much quicker than other kinds.

Lady Frere (Mr. J. E. Elliott.)—Sown about October. Result : Good. This is a very hard mealie, and matures quickly. As a green mealie not of much use, owing to grain being so small, and it hardens very soon. Excellent feeding for poultry. Attacked slightly by green worm common to Colony. This worm attacks all mealies if sown before November.

Bredasdorp (Mr. H. H. van Breda).—Sown 3rd September, 1906. Result : Fair. For cooking in its green stage it is much appreciated, while fruit and other vegetables are not yet obtainable. At present I have a piece of land planted for use before the winter. Seed sown on unirrigated soil suffered from dry weather. I consider it will pay as an early catch crop for stock.

OTHER SORTS.

Of several other sorts favourable reports have been received, but not in sufficient numbers to justify publication in detail. Amongst these are

Wisconsin White Dent, Iowa Gold Mine, Iowa Silver Mine, Sweet Fodder Corn and Pop-corns.

In addition to these sorts introduced experimentally by the Department of Agriculture, three very good mealies, originally imported, but of which the proper names have been lost, are being carefully grown for seed purposes by their respective discoverers, and are obtainable under the following names:—(1) Murray's Perfection, from Mr. Walter Murray, Roodebloem, Graaff-Reinet; (2) Manifold, from Mr J. W. de Kock, Mafeking; (3) Smith's, from Mr. Sidney Smith, Vryburg.

Small quantities of the following varieties for experimental purposes are obtainable from the Agricultural Assistant, Cape Town, viz.:—

Wisconsin White Dent.
Snow White Dent.
Thoroughbred White Flint.
Leaming.
Pride of the North.
Perfected Golden Beauty
Iowa Silver Mine.
Sweet Fodder Corn.
Cinquantino.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during October, 1907.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £	s.	d.
Cape Town ...	German South West Africa.	2	Pineapples ...	225	2	17	6
" ...	"	2	Figs ..	1 200	6	0	0
" ...	"	3	Pears ...	150	4	5	6
" ...	"	8	Lemons ...	1,075	2	0	6
" ...	"	8	Naartjes ...	1,650	17	12	6
" ...	"	38	Apples ..	4,890	24	12	6
" ...	"	21	Bananas ...	14,700	21	15	6
" ...	"	53	Oranges ...	12,700	33	2	6
Port Elizabeth	England	100	Naartjes ...	3,000	17	10	0
		235		32,590	129	16	6

REPORT ON VINE INSPECTION

THE TULBAGH DISTRICT.

The following report by the Commission on American Vines is published for general information:—

Although, as stated in the Worcester report on the vineyards of that district, the class and situation of the soils in all these districts varies greatly, which necessitates a careful choice of stocks for the different soils, there seems to be a greater uniformity in the composition and characteristics of the soils of the Tulbagh vine-growing area than in the other areas visited—especially on the slopes and higher grounds, to which the vineyards are gradually creeping. This is a good departure in many respects, and the farmers are quite satisfied that they are losing nothing by deserting the time-honoured vlei and carrying their vineyards on to higher and, no doubt, more suitable situations. The wine made on these sites will prove of a higher character and a better type than that made on the vleis. The working of the vineyard will be easier, and artificial drainage is uncalled for over these areas with their porous subsoil of disintegrated shale.

There is indeed in this district an almost unlimited area of very fine vineyard soil from which some of our best wines should come The liability and effects of fungoid disease will be far less. The making of a cleaner wine will be easier than from vines grown on the bare grounds where the product is charged with a super-abundance of nitrogenous matters. It may perhaps be said that the yield will be less, but from what we have seen of the yields, and the perfection to which the grapes attain, we have no hesitation in predicting that the returns will be as great, if not greater, than anything hitherto obtained on the low grounds

The first farm visited was that of Mr. W Brodie, "Orange Grove." Here we found Green Grape on Metallica in very stiff clay delved to a depth of 3 feet. This part of the vineyard was practically ruined through the deep delving. In its natural state there was about a foot of good, loose soil on top. This was turned under and a pot-clay surface of about 2 feet placed on top. At the present time it is almost impossible to cultivate at any period of the year. If wet, it is too plastic, and when dry it is like a brick. Irrigation has been tried, but seems to do more harm than good The vines on this patch are five years old and thriving badly. Adjoining is Stein on Metallica in similar soil trenched 2 feet deep, doing much better, as the clay turned up from this shallower depth is not quite so stiff, is more workable, and the roots have found the arable soil which was turned in at a reasonable depth. The 30,000 grafted vines are mostly on Metallica Some three-year-old Hermitage is fairly good. The soil on the whole is not the best suited for a vineyard.

At Mrs. Theron's farm we have Green Grape, some on Aramon and some on Metallica, in stiff clay soil with a little gravel here and there. The Green Grape on Aramon, five years old, looks far better than that on Metallica of the same age. The ground has been trenched to a depth of eighteen inches. The vines are bearing fairly well. But there are a number of brak patches in the vineyard on which the vines on either stocks die out.

Close to the village of Tulbagh we come to Dr. Beck's farm, "Oude Drostdy," on a foot hill slope with a good aspect, and merging from a

fairly stiff soil, at the bottom, and into a light, fertile, gravelly soil as you ascend. Three-year-old Hanepoot on Jacquez carries an immense crop of very fine grapes, and one-year-old Hanepoot on the same stock is doing well. Two-year-old Green Grapes on Metallica, in medium loose gravelly soil, is carrying a good crop. A patch of Jacquez on the hillside, one year old, to be grafted *in situ* next season, is doing fairly well, but for some pest having ring-barked a number of the sticks at the surface of the ground, causing them to die or break off with the wind. About 4,000 Muscadel on Metallica on the hillside are good. One-year-old Muscadel, on Metallica own grafting, are also good.

In one portion of the vineyard the vines are planted 5 feet by 5 feet with every third row left out, which makes it very convenient for harvesting and other operations, as with a ten-foot road between each four rows a vehicle can be got through On account of the roots having a greater foraging area, little, if any, decrease in the returns is anticipated.

On Mr. J. F. Theron's farm, part of "Misgund," is Green Grape on Metallica in heavy low-lying clay, not looking well, soil and site quite unsuited for vines, at any rate vines grafted on Metallica No doubt at some period in the past, vines were successfully grown in these vleis; probably ungrafted Green Grape; where the soil was kept drained by numerous open sluits, and the prunings of the vineyard spaded in each year. But conditions have changed considerably. What was done in the way of cultivation in olden times by hand is now done with animals; fungoid, and other diseases that were not then known are now rampant, and farmers are beginning to realise that good returns may be got from the slopes and hillsides, and that the quality of the wine is better. A patch of Muscadel on Aramon is growing well, but, as no attention has been given to sulphuring, it is so seriously attacked by Oidium, that for making a decent wine, the crop is practically worthless. Some Hermitage on Aramon is looking fair. Hanepoot on Jacquez is almost eaten up with Oidium. 26,000 Stein on Metallica on drier ground look fairly well. The land is partly drained by open sluits, but the water table is still very high.

On Mr. P. Theron's farm, part of "Misgund," we have, in heavy deep, naturally well-drained soil some Green Grape on Metallica four years old, good. Also Hermitage on Metallica doing well. Another block of Green Grape on Metallica, four years old, on stiff, sloping, well-drained soil, is looking fairly well Younger vines on the same stock are doing well. Green Grape, in fairly wet open soil, 2 years old, are bearing heavy crops. Stein on Metallica, three years old, good crop, but very bad with Oidium. The question is, will these young vines now doing very well on Metallica last in these and like situations where the water level is high? From our own experience and from the experience of other parts, we are inclined to say that it is very doubtful.

On Mr. Malherbe's farm, portion of "Klip Fontein," we find a block of Green Grape on Metallica on slightly sloping, rich-looking soil with a fair percentage of ironstone gravel. These vines are doing well and bearing a nice crop. Muscadel, two years old, on undulating sandy loam, look very well, and are heavily laden Last season's Green Grapes on Metallica doing well.

Mr. P. van Tulleken's farm, "La Bonne Esperance," is now reached, where we see some Green Grape, one year old, on Metallica, on hillside, light gravel inclined to sand, excellent.

On "Klip Fontein," belonging to Mr. G. J. Euvrard, Green Grape near house, seven years' old, on mixed stocks supposed to be Rupestris of some sort, on sloping, sandy soil, looking well, and carrying a very heavy crop of fine grapes. Those encroaching on the hill side look even better than those in the flat. Disintegrated shale is the sub-soil, and most of the subsoil throughout the district is of this nature. The vines invariably do

well where it is found. Hermitage on Aramon, same soil as last, two years old, looking well, and carrying heavy crop. White French on Aramon, one year old, open soil. Green Grape on Rip. Gloire, and Montpellier, six years old, growing on river bank, good.

Next comes Mr. A. J. du Toit's farm, "Klip Fontein," with White French, four years old, on Metallica, on gentle slope, all made soil, inclined to be sandy in lower parts and more gravelly higher up. These vines are very fine indeed, and carry a magnificent crop. Stein on Aramon, four years old, doing very well. When these vines were planted the ground was not trenched; it simply got a light ploughing, and the vines were stuck in with a crowbar. Green Grape on Metallica, on hillside, was planted same year as old vines, were taken out, looking splendid. Muscadel on Metallica, seven years old, on hillside gravelly wash, almost perfection in every respect. White French and Muscadel on Aramon on hillside good, but not quite so good as the White French on Metallica in similar soil The whole of this vineyard is ideal Metallica ground

Mr. P L. le Roux's farm "La Rhone," is on well-drained rich river bank flats. Sultana, Raisin Blanc, and Waltham Cross, five years old, grafted on Aramon, and trained on high trellis, doing very well. Muscadel on Metallica, one year old, good. White French on Riparia, two years old, on Aramon, carrying heavy crop, well grown and healthy Block of two-year-old same as last, good all through. Same on Metallica, similar soil, no perceptible difference in vines or crop.

General Remarks.

Most of the vineyards in this district are well cultivated and cared for, and with the exception of one or two bad cases of Oidium, practically no disease was noticed.

The grape most grown over this area seems to be White Green Grape, which may probably be accounted for from the fact that in pre-phylloxera times it did so well in the vleis, and on that account became very popular. It by no means makes as fine a wine as the Stein. The objection a good many have to growing Stein is that it is rather subject to Oidium, but that may be overcome by judicious sulphuring. In most parts of this district three sulphurings should be quite sufficient to keep the vines clean. This would cost from six to eight shillings per 1,000 vines, including labour, if a torpedo sulphurator is used.

From the composition, nature, and disposition of large areas of soil in this district, it seems admirably adapted for vine-growing, and with the advantage of a centrally situated winery, the industry should go ahead by leaps and bounds. It will no doubt, before long, be known as a part that produces as fine a wine as any other part of South Africa.

In reference to stocks, except in the stiff vleis, Metallica should do well in all other places if the ground be well trenched. When Metallica is mentioned we mean the Constantia Metallica, or what is known among a good many of the farmers as the "Right Metallica." Jacquez, Mourvedu X Rup. 1202 or Rip. for Hanepoot, and Aramon X Rup., Rip. Gloire for other varieties in the low-lying sites, especially if the water level is high. Metallica also stands a fair amount of moisture if the soil is loose and the drainage good.

We have to thank those on whom we called for the courteous way in which they received us, and for the keen interest they took in our mission.

(Signed) I. Tribolet.
G. J. Euvrard.
J. F. Theron.

SALTBUSH.—A REPORT ON CO-OPERATIVE EXPERIMENTS.

By Eric A. Nobbs, Ph.D., B.Sc.

Over a wide area of the Colony, particularly in the north-west and the Karroo, Saltbush has long been established, and is highly esteemed and regularly used. A considerable sale exists for the seed, and the plant is in no way regarded as of doubtful value nor merely experimental. Elsewhere, however, it is not so well known nor its use and mode of culture so well understood. This is evidenced by the active enquiry which exists for small quantities for trial sowing, and by the evidence of the accompanying reports which show that it has often been sown on soils and under conditions quite unsuited to it. The seed, too, though prolific, is not all capable of germination, and this seems to have given rise to disappointment.

The chief value of Saltbush is that it will grow where no other plant fit for feeding purposes will thrive, on brack, alkaline ground, and with but a light and occasional rainfall. When once established it reproduces itself lavishly. The fodder is saline but succulent, and all stock seem to enjoy it as an addition to their normal diet. Easily as it does grow, it is yet not sufficient to throw it out on the veld; on the other hand it is neither necessary nor desirable to thoroughly till and prepare the land as for a crop of grain.

To introduce Saltbush on to a piece of brak land a good plan is to loosen the soil with a spade or hoe in patches some little distance apart. Some advise a patch every 6 to 8 feet, others every 10 yards, but in the latter case the plants must be allowed to flower so as to spread seed all round. Six to twelve seeds are dropped on each prepared patch and covered to a depth of ¼ to ½ an inch. A thorny bush is then placed over the seed so as to shelter the young plants until the stalks become woody and hard. The quantity of seed required will obviously vary with the distance apart of the patches, but as about 20,000 seeds go to the pound weight, very little is needed. Ten seeds every two yards, which is a generous allowance, means only about 1¼ lb. per morgen, while at 10 yards apart this is reduced to about ½ lb. per morgen. It is said that if the seed does not get water within 5 or 6 days of being sown, it dies, but there seems to be some doubt on the point. One or two wettings, whether from rain or by flooding, are sufficient to ensure its growth.

Another successful plan is to sow the seed broadcast over the veld *during* rain, and then drive a flock of small stock back and forward to tread it in. Much more seed, say 8 to 10 lbs. per morgen, will be necessary for this method, and stock must be kept off the area for some months after, as thorn bushes cannot be used to protect the young plants as in the system first detailed.

Land which has been under cultivation, but has become brak, may with

advantage be sown with Saltbush. The land may be ploughed and the seed dibbled in, or a furrow may simply be drawn every few yards and the seed sown in the loosened ground and covered with a second furrow. It will spread naturally very fast on tilled ground.

If any difficulty be found in getting Saltbush to grow from seed, then it can readily be propagated from cuttings buried some 8 inches in the soil; this is, however, a slow and somewhat laborious method.

Saltbush seed may be sown at any time of the year when the soil is moist, except during the winter, and, so far, no particular season has been found to be best.

All Saltbushes prefer moist, brackish land, but are able to accommodate themselves to a great variety of conditions.

The reports appended are by no means all encouraging, but the want of success seems mainly due to unsuitable conditions, and this plant so valuable in brak situations is not to be condemned for failing to succeed where ordinary fodder crops such as kale, mangel, vetches and so forth would have been more appropriate. Most of the accompanying reports, it will be noted, emanate from regions of moderate or plentiful rainfall, and where brakness is not a well-developed characteristic.

Vryburg (Mr. W. H. Edmonds).—Sown December. Sown on irrigated land. Failure, due to heavy rains. Might do better if sown in January, when rains are lighter but more continuous and weather cooler.

Venterstad (Mr. H. M. Anderson).—Sown: No date given. Result: Good. Seed came up very sparingly, but the bushes that are growing look very healthy and are doing well.

Tarkastad (Mr. F. E. Leppan).—Sown: No date given. Sown in bare spaces in a lucerne field. No result at all.

Tarkastad (Mr. W. D. Townsend).—Sown November. Seed did not germinate.

Aliwal North (Mr. C. Dorrington).—Sown: No date given. Result: Negative. Seed failed to germinate.

Cradock (Mr. J. B. van Heerden).—Sown 8th November, 1906. Result: Bad. The ground where sown, in my opinion, ought to be brak. The ground not being suitable is perhaps the cause why so few plants came up. Have planted balance of seed on hard brak in the veld.

Somerset East (Mr. H. O. Hiscock).—Sown 3rd July, 1906. Result: Poor. Saltbush seems quite unsuitable to this mountain veld. Sowed seed in the veld after rain and ran the sheep over it; also sowed same on ploughed land. Only a few plants grew, and these are not thriving.

Elliot (Mr. T. L. Thompson).—Sown January, 1906. This seed failed entirely. It may have been sown at the wrong season, or it may have been destroyed by the fly as the seed germinated.

East Griqualand (Dr. G. R. Watson).—Sown 19th December, 1906. Destroyed by insects.

Fort Beaufort (Mr. Philip J. Nel).—Sown October and November. Result: Fair. I believe the seed was not good. I have sown three times, but only a few plants came up. I have not yet allowed stock to graze in it as there are only six plants. I have also sown the seed in old lands and loosened the ground. Had plenty of rain but still the seed did not germinate. The plants which have come up are beautiful, and seem very good for cattle.

Fort Beaufort (Mr. W. W. Painter).—Sown October, 1906. Sown broadcast and thickly on unirrigated land. Failed to germinate. Weather wet.

Queenstown (Mr. T. H. McCune).—Sown 20th November, 1906. Sown broadcast on unirrigated land. Weather rainy. Crop never reaped. Have kept a small quantity of the seed, and will try same again next year.

Grahamstown (Mr. W. N. Gradwell).—Sown 16th June, 1906. Result: Bad. Seed germinated badly—the few that did come up died young. Do not think it suitable for district. Too dry.

Grahamstown (Mr. W. F. Hawke).—Sown 10th October, 1906. Result: Bad. Sown on unirrigated land, first broadcast, second in drills. Seed germinated very badly, and when it did come up it remained very stunted, and finally died in the very exceptional heat we have had this summer. I do not think the soil I used was suitable, being very rich. I intend sowing again in the spring.

Albany (Mr. P. J. Norden).—Sown October. Result: Good. Sown broadcast and thickly on unirrigated land. Very suitable to district, and will pay. Stands drought well, and is splendid for ostriches, and even cattle take to it.

Triangle (Mr. de Voss, Junr.).—Sown: No date given. An absolute failure. I think, if the seed is not bad, that it germinates too slowly for sowing roughly in the veld.

Swellendam (Mr. H. O. Eksteen).—Sown August. Result: Indifferent. Seed was thriving well and prospects appeared to be good, but unluckily the recent floods swept over the ground where the seed was planted and greatly damaged same. Some few still remain.

Swellendam (Mr. H. J. Linde).—Sown June. Result: Fair. I consider it will pay to grow. The seed sown on soil of Karroo nature gave a small crop. I am very well pleased with the bush, and intend sowing again.

Swellendam (Mr. J. B. Lourens).—Sown July and September. Sown thickly on unirrigated land. Seed did not come up at all, perhaps due to the fact that it was sown out of season and not watered. Intend making a further trial at beginning of next winter.

Swellendam (Mr. Donald Moodie).—Sown: No date given. Seed sown in carefully prepared ground in the garden, but none came up. I think our black clay soil cannot be suitable for it. I think Karroo soil would be the most suitable.

Riversdale (Mr. A. L. van Wyk).—Sown November, 1906. Seed germinated badly, and the few plants that grew were destroyed by the flood in December.

Bredasdorp (Mr. D. P. du Toit).—Sown April, June and August. I think the soil is not brak or salt enough.

Caledon (Mr. J. S. Le Sueur).—Sown July and August. Result: Excellent. Sown broadcast and thinly on unirrigated land. I consider it suitable and will pay here, and intend sowing on a larger scale in future. I intend sowing the seeds gathered next season.

Claremont (Mr. C. S. Munns).—Sown 1st October, 1906. Result: Poor. Came up very poorly, and were burnt up by heat and wind. March–May will be better months for sowing. Will make another trial after first rains.

Moorreesburg (Messrs. C. Starke and Co.).—Sown 13th June, 1906. Result: Good. I consider this saltbush most suitable for the district as we have plenty of brakish land, that at present gives no crop. Will pay well as a cattle feed. Very few plants appeared, but these did very well.

Klipheuvel (Mr. L. C. F. Smith).—Sown June. Result: Good. Suitable and will pay in these parts.

ANALYSIS OF PRIZE WINES.

The following are the results obtained by analysis of the prize wines and brandies exhibited at the recent Wine Show of the Western Province Board of Horticulture.

I.—WINES.

Class.	No.	Description of Sample.	Prize.	Alcohol by volume, per cent.	Extract, per cent.	Total Acid as Tartaric, per cent	Volatile Acid as Acetic, per mille	Sulphurous Oxide, milligrammes per litre.
1		HOCK TYPE.						
	4	P. & P. Rabie	1st	12·60	1·997	·524	·334	128
	7	Farmers' Co-Operative Wine Co, Stellenbosch.	2nd	13·19	2·344	·635	·564	52
	11	W. A Krige	2nd	13·95	2·336	·589	·572	99
	1	J. H. Marais ..	3rd	13·92	2·291	·586	·528	135
	9	Government Wine Farm ...	3rd	11·60	1·782	·432	·468	Nil
2		SAUTERNE TYPE.						
	16	E. Lange	1st	14·68	2·636	·635	·582	124
	13	J. D. Krige, W/A son ..	2nd	14·01	2·411	·537	·740	99
	19	W. A. Krige	3rd	14·01	2·311	·550	·832	99
	15	W. Spilhaus .. .	V.H.C.	11·32	2·209	·772	·588	12
	18	T. J. de Waal	V.H.C.	12·88	2·280	·681	·468	153
3		SHERRY TYPE.						
	22	E. Lange	1st	14·97	2·662	·570	·584	119
	25	H. J. Joubert . ..	2nd	14·68	2·569	·537	·588	100
	23	R. W. Boyes	3rd	14·97	2·692	·582	·706	84
4		SWEETISH WHITE WINE.						
	27	J. H. Marais ...	1st	14·58	16·26	..	·424	79
	31	H. J. Joubert	2nd	16·54	6·04	·420	·588	46
	29	G. A. Retief	3rd	14·01	9·77	·409	·666	26
5		SWEET WHITE WINE.						
	32	P. & P. Rabie	1st	15·60	29·44	·344	·252	5
6		STEIN.						
	39	R. W. Boyes, Mulder's Vlei.	1st	12·41	2·282	·448	·540	144
	37	Drakenstein Co-operative Winery.	2nd	13·72	2·481	·643	·816	10
	41	H. J. Joubert	3rd	13·34	2·558	·557	·588	104
	34	W. Spilhaus	V.H.C.	11·86	2·172	·802	·468	Nil.
	35	F. F. Versfeld	V.H.C.	11·59	2·065	·660	·474	Nil.
	36	Farmers' Co-Operative Wine Co., Stellenbosch.	V.H.C.	12·41	2·578	·491	1·020	57
7		GREEN GRAPE.						
	48	J. F. du Toit	1st	12·41	2·273	·495	·564	29
	49	H. J. Joubert	2nd	13·25	2·458	·593	·516	158
	45	J. D. Krige, W/A.son ...	3rd	12·69	2·325	·624	·748	200
	46	P. J. Cillie, C.son... ...	V.H.C.	12·69	2·500	·532	·672	89
	44	J. W. Schabort	H.C.	12·05	2·622	·548	·876	179
8		WHITE FRENCH.						
	51	P. & P. Rabie	1st	12·50	2·126	·478	·420	122

I.—WINES (*continued*).

Class.	No.	Description of Sample.	Prize.	Alcohol by volume, per cent.	Extract, per cent.	Total Acid as Tartaric, per cent.	Volatile Acid as Acetic, per mille.	Sulphurous Oxide, milligrammes per litre.
9		ANY OTHER WHITE WINE.						
	54	P. & P. Rabie	1st	11·50	2·110	·540	·384	116
10		CLARET TYPE.						
	61	High Constantia Estate ..	1st	12·32	2·228	·544	·600	Nil.
	69	F. F. Versfeld	1st	11 14	2·037	·511	·600	Nil.
	58	A. B. de Villiers	2nd	11·23	2·544	·583	·864	19
	66	C. W. H. Kohler	2nd	11·95	2·307	·496	·532	40
	73	E. Lange	3rd	11·59	2·595	·635	·618	25
	75	L. Cloete . ..	3rd	11·59	2·088	·540	·492	Nil.
11		BURGUNDY.						
	82	High Constantia Estate ..	1st	12·14	2·589	·501	·660	Nil.
	85	F. F. Versfeld	1st	11·41	2·125	·501	·696	Nil.
	77	J. G. van Niekerk ..	2nd	11·14	2·596	·639	1·172	120
	87	E. Lange	2nd	10·88	2·411	·602	·408	36
	78	A. B. de Villiers	3rd	12·14	2·779	·472	·742	18
	88	L. Cloete	3rd	11·59	2·128	·550	·588	Nil.
12		DRY PORT.						
	93	H. Cloete	1st	12·32	2·353	·563	·888	Nil.
	90	P. & P. Rabie	2nd	17·84	3·510	·698	·360	23
13		SWEET PORT.						
	95	Montagu Co-Operative Winery.	1st	15·26	11·63	·524	1·668	12
14		SWEET RED WINE.						
	96	P & P. Rabie	1st	15·16	30·31	·360	·204	Nil.
15		HERMITAGE.						
	99	J. H. Marais	1st	10·35	2·466	·419	·720	71
	104	Drakenstein Co-Operative Winery.	1st	11·41	2 420	·473	·780	25
	108	E Lange	2nd	10·96	2·400	·599	·576	25
	109	L. Cloete	2nd	11·41	2·128	·504	·660	Nil.
	111	J. F. du Toit	3rd	11·95	2·552	·452	1·080	25
	113	Myburgh Bros.	3rd	13·72	2·983	·354	·828	76
16		CABERNET SAUVIGNON.						
	114	High Constantia Estate ...	1st	12·41	2·564	·512	·612	Trace.
	116	F. F. Versfeld	1st	11·14	2·503	·511	·780	Trace.
	117	H. Cloete	2nd	11·77	2·443	·512	·756	Trace.
	119	Government Wine Farm ...	3rd	11·32	2·248	·521	·600	Trace.
17		PONTAC.						
	121	G. A. Retief	1st	19·24	3·812	·491	·798	Trace.
	120	P. & P. Rabie	2nd	18·24	3·566	·600	·468	Trace.
	122	Drakenstein Co-Operative Winery.	2nd	14·20	3·597	·401	1·050	Trace.
	124	H. J. Joubert	3rd	12·32	2·912	·532	2·016	51
22		JAGGER CUP WHITE WINE.						
	133	P. & P. Rabie	1st	12·05	1·963	·521	·378	128
23		JAGGER CUP RED WINE.						
	147	High Constantia Estate ...	1st	11·86	2·215	·510	·612	Nil.

The wines contained quantities of Potassium Sulphate below the legal limit.

II.—SPIRITS.

Class.	No.	Description of Sample.	Prize.	Proof Spirit, per cent.	Alcohol Volume, per cent.	Extract, grammes per 100 c.c.	In grammes per 100 litres absolute alcohol.				
							Volatile Acid.	Aldehyde.	Turperol.	Ethers.	Higher Alcohol.
19		WINE BRANDY.									
	126	H. Cloete ...	1st	94·7	54·0	·0568	43·8	4·6	·31	98·5	228
	127	James Malan ...	2nd	82·9	47·3	·8448	109·3	13·3	·43	228·6	361
20		DOP BRANDY.									
	129	James Malan ...	1st	88·7	50·6	·2588	91·1	54·0	·20	138·2	165
21		VAN DER HUM.									
	131	Rudolph Cloete ...	1st	53·4	30·5	46·368	...	...	...	...	...

J. LEWIS, M.A., Analyst.

SPECIAL SHEEP PRIZES AT THE W.P. AGRICULTURAL SHOW.

£100 FROM THE BEIT BEQUEST.

Through the generosity of the Trustees of the Beit Bequest, the Western Province Agricultural Society is in a position to offer the following valuable prizes for Merino sheep, which, owing to the educational value of the awards, will, it is hoped, be largely competed for by sheep breeders throughout the country. The prizes in question will be known as the "Alfred Beit" prizes.

(*a*) A Champion Challenge Prize, value fifty pounds, to be awarded for the best S A. Bred Merino ram, under the following conditions:—All rams entering for this prize to be exhibited at the 1908 Show at Rosebank (either for prizes or otherwise), and to be then not more than 2-tooth. All rams to be passed by the judges as suitable stud sires. After passing this test, the rams to be shorn bare in the Show Yard under the supervision of the Society, and to be branded with a distinguishing mark for identification. If possible, arrangements will be made by the Society for the rams to be run for 12 months on the same farm, and under exactly similar conditions, provided a farm can be obtained suitable for both grass-veld and Karoo-veld animals; but if this be not found feasible, the owners will be allowed to run the animals on their respective farms, with the distinct stipulation that they are to be run under natural weather conditions, and are to be neither housed nor clothed. The rams entered for this prize to be again exhibited at the 1909 Show, and to be shorn in the Show Yard. Their fleeces will then be properly skirted, weighed, and valued in the grease by experts, the fleeces will afterwards be hot water scoured under the supervision of the Society. The scoured wool will be weighed and valued by experts, and the prize will be awarded to the owner of the animal giving the greatest monetary value of scoured wool. The entry fee for this prize will be two guineas, and entries will be received up to the 25th February, 1908.

(*b*) Two prizes, value twenty-five pounds each, will also be offered at the 1909 Show

(1) For the best pen of 10 S.A. bred Merino rams and 10 or 15 ewes reared on Karoo veld.

(2) For the best pen of 10 Merino rams and 10 or 15 ewes reared on grass veld, mixed veld, or other than special Karoo.

The pens of animals must be of one type or character. Full details will be published in the 1909 prize list; but as the animals entered for these prizes must have been run under natural conditions, and must not have been either housed or clothed during the twelve months preceding exhibition, the announcement is made in good time, so that sheep breeders who may be desirous of competing can comply with the necessary conditions.

CORRESPONDENCE.

Correspondence and contributions are invited on all subjects affecting the Farming Industries of South Africa, suggestions for consideration or hints as to improved methods being particularly welcome. It should in all cases be distinctly understood that we do not hold ourselves responsible for opinions expressed or statements made.

Questions are also invited. In this department, every endeavour will be made to procure the desired information for publication in the next issue, but this cannot be guaranteed in the case of letters received after the 20th of the month. Should a correspondent deem his enquiry urgent, he should say so, and an answer will be returned *through the post* as soon as possible.

All letters or contributions should be plainly addressed: "The Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town"; they should be written on one side of the paper only, and be accompanied by the name and postal address of the writer, not necessarily for publication, but as a guarantee of good faith A *nom de plume* may be attached for publication

South African Stud Book.

the Editor, AGRICULTURAL JOURNAL

SIR,—The second volume of the South African Stud Book is nearing completion, l will be of value in many respects. It will be a carefully compiled record of much uable stock in the Colonies affiliated—the Cape, Transvaal, and Orangia.

The amount of support given to this work by breeders is remarkable and causes at encouragement, mainly because Stud Book Associations are not as a general rule itutions of rapid growth, or sources for encouragement in the earlier stages.

The original promoters undertook the work with a certain estimated support, but n the whole the cordial co-operation of stock-owners far surpassing the estimated p, the breeders, who are members, loyally working towards the object and the goal, , the improvement of our stock and the recording of the pure bred ones Of course, h remains to be done, and many breeders are not yet members, whose support is ly needed. The principles of the Stud Book, wherein it works each section of k entirely separate, is giving each year more satisfaction, as far as the writer is re, and some trouble has been taken to find out any objections. Of course, it ld be impossible to meet the exact wishes of every individual, though every indi- ual breeder is given the greatest scope for the full play of all his abilities and gifts a stock-breeder. This is absolutely necessary, because no body of breeders can ectively breed a good animal. We all know it is the individual only that can do . The Association aims solely at encouraging the individual in every possible way the general good of the country, as well as for his own benefit These remarks r to the work in general terms, and chapters might be written regarding the work ach section in each of the Colonies, but the time for a full statement will be when Association holds its annual meeting. Still, as far as the Cape is concerned, aps a word upon the ostrich section of the Stud Book will not be out of place here. ay not be generally known that it was this section of breeders who largely helped ring about the formation of the S.A. Stud Book Association. At the first meeting radock this section was taken up with determination, and has been pushed forward r great difficulties. The Stock Committee appointed to work the section have ng, the last two-and-a-half years often met, travelling long distances at their own nse, to discuss and to the best of their ability and lights work out a standard and nge a method for testing each bird to ascertain if it comes up to the required ity. First for entry in the auxiliary book for a probationary period, and subse- tly in the Stud Book proper. This Committee now consists of Messrs. O. E. G.

E

Evans, A. Mulder, Claude Southey, J. M. C. Bowker, F. W. Baker, M. Gadd, O. Fourie, S. Gilfillan, H. Collett, and others. The difficulties have mainly been in deciding upon a standard of merit entitling a bird for entry. Then the examination of feathers of each plucking from the birds offered for registration and awarding points to the pluckings in a stock of this kind that has, of comparatively recent date, been brought into domestication. There is so much to learn, and many breeders have, of course, very decided opinions upon what is the best method of admitting stock to the registry. Nevertheless, upon the whole, breeders, who have had birds refused, have taken the Committee's decisions in an exceedingly fair spirit, thereby proving the conviction that the Committee are aiming to work for the general good of the industry. The exceedingly limited number of birds accepted proves that quality and not quantity is the aim of all concerned, which must in due time tend to assist in proclaiming the gospel and breeding "only the best." This is now done very largely. There is, however, room for great improvement in this direction.

It is hoped that any breeder who is in doubts as to the correctness of the Committee's course of action will not hesitate to write the Secretary of the Stud Book, Box 703, Cape Town, the nature of his doubts, which will, together with any recommendations, always secure careful consideration.

By working together we can accomplish much. By isolation and separation we weaken a good cause and hamper progress. This is a trueism admitted by all.—Yours, etc.,

C. G. LEE.

Klipplaat, November 10th.

The Rearing of Ostrich Chicks.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—From observations and what I have gathered from discussions on the subject, might I be allowed to make a few suggestions which may be of use to ostrich farmers. I do not by any means consider my arguments conclusive, but will bring forward this line of thought in hopes it may suggest points to others and by collecting theories and the facts on which such theories are based we might make an attempt to get at the bottom of the difficulty.

Many of the older farmers tell me that formerly they never experienced the bad chick seasons they have of late years. They had losses, it is true, but from a totally different cause, and one which to-day we are able to a certain extent to cope with, namely, tapeworm, which only attacked the chicks at a much later stage of their lives than that at which they are dying at the present time. At that time they had no lucerne paddocks in which to rear their chicks; they hatched and remained with the parent birds until caught, when they were put in charge of a herd and sent to forage for themselves in the veld. Under these circumstances they thrived infinitely better than they do to-day, until, I say, at a later stage they developed worms, as most young stock, I think, are liable to do. *Post mortem* examination to-day usually reveals yellow liver and intestines, and I believe our chicks are dying of biliousness or other affection of the liver or digestive system generally.

When the young chicks are hatched in the natural way under the parent birds, as soon as they are out the parent birds get up and commence feeding, and you find the little chicks struggling along after them, and you wonder when they get time to feed. On the other hand, when hatched in an incubator, or when taken away from the parent birds immediately they have been hatched, they are put in the sun, on lucerne, with a little Hottentot or Kafir boy to watch over them, whom you invariably find sitting or lying down with the chicks clustered round him. In this way the chicks get more time to feed, get richer feeding and no or very little exercise. Then again, if you watch a chick feeding on the veld it appears to pick up grit incessantly, it will feed off one bush, and on moving to the next will pick up grit between. In this way the grit gets *thoroughly intermixed* with the food it has swallowed, which, I should think, is absolutely necessary for proper mastication and ultimate digestion. When a chick is hatched artificially, it is rarely allowed to pick up sufficient grit before being put on the lucerne in the morning, and when once on the lucerne is kept there during the greater part of the day, and only gets a second chance of obtaining grit on its way to be put up for the night, if the ground it has to cover happens to contain the grit it requires. The crop thus becomes overcharged with an accumulation of tough lucerne leaves which an insufficient quantity of grit is unable to cope with from the outside, as it were (that is, you have in the crop in the

following order, the grit picked up in the morning, then the accumulation of a whole day's feeding on lucerne, and then the grit it has managed to get before being put up for the night. So it is not unreasonable to suppose that the grit is going to work its way through and thoroughly masticate this accumulation of tough lucerne?) and the liver and other organs of the digestive system become out of order. Again, I have noticed in grown birds that those especially which have brak veld to feed on, their dung is soft and of a light colour, whereas that of those on lucerne is very dark and in a hard and dry state. I do not know whether it is some property in the brak veld which keeps the bowels of the birds open or whether it is simply that the food is more suited to the ostrich. However, whatever the cause, this I do maintain, that as far as the health of the bird is concerned, it would be hard to find better feeding than a sufficient quantity of good brak veld, and I am sure our chicks would benefit greatly therefrom if we allowed them only an hour, not more, on the lucerne, and two hours in the veld, alternately. We should also try to avoid having our breeding camps entirely of lucerne, and should not attempt to rear too many chicks in a season, but allow the breeding birds to hatch out the majority of their own chicks and allow them to remain with their parents *in their breeding camps* for at least a fortnight or three weeks (I emphasise "in their breeding camps" for this reason. If you take the parent birds out of the camps they are used to they may fret and not take proper care of the chicks, and it is essential that the chicks receive no check during the first few days of their lives, the most delicate stage), and only incubate and try to rear by hand from the commencement a limited number of chicks for experimental purposes until we know more about the proper handling of them or are convinced that we can rear as many in the latter as in the former way. I think we will always have less difficulty in rearing a few chicks than a large number. When there are fewer we are able to give them better attention, there is less chance of the stronger ones exhausting all the more tender food essential to the younger and weaker ones, and the ground they have to run on does not become so foul or stale.

With regard to sleeping arrangements, see that the chicks are warm enough at night, but not too warm, too much heat is weakening and affects the liver, and therefore the digestion. Always allow sufficient fresh air, but remember it is easier obtained in winter than in summer, as in cold weather heat rises more rapidly. So if the smaller chicks are being put into boxes to sleep in winter, cover over with sacks and allow only sufficient opening to allow the foul air to escape, but not the body heat of the chicks. On warm nights in summer it is advisable to allow the chicks to sleep open in a room, penning off the different sized ones separately to prevent injury to the smaller and weaker ones by being trampled by the bigger chicks and allowing sufficient space to enable them to spread out if they get too warm.

There is a point which suggests this theory may be all wrong from beginning to end, it is that some seasons chicks do quite well when kept entirely on lucerne, but who can say they would not have done even better had nature been studied and followed more closely? If, however, after careful consideration, it is decided by competent and experienced men that these ideas are proved wrong by facts or results and they make known the reasons whereby they prove and consider them wrong, we will thus get a number of interested men, with all available data at their disposal, thinking and experimenting, and so stand a better chance of arresting the serious losses which ostrich farmers are experiencing year after year.

I have heard it stated that it is not an individual's interest if he is in possession of a secret whereby he is enabled to rear more chicks than those around him to divulge it. This is intensely selfish and unworthy of anyone having his country's welfare at heart, and, moreover, a totally wrong idea. If his fellow-farmers are prospering and he can materially enhance the revenue derived from the exports of this country he will have a better chance of becoming a rich man. What is the use of rearing a lot of chicks if your neighbour cannot afford to pay an adequate price for them. You may argue that he will cease to buy your chicks if he can rear them for himself—true, if you have relied solely upon rearing more chicks than your neighbour—but in this case, too, there is the danger that he will cease to buy your chicks because they are not good enough, whereas if you rear only a moderate number of the best, and do them really well, there will always be a ready sale for them. Your neighbour will buy your chicks and pay you a good price for them, because when grown, although only eating the same amount of food, their feathers will realise more money, and will sell those he has to someone else, on whose they again are an improvement. In this way the country will gradually become stocked with a better class of bird than it is to-day, and consequently the revenue derived from the exportation of ostrich feathers considerably enhanced. If anyone then can ascertain and will make known the cause from which such a large percentage of our chicks are dying he will not only be benefitting himself but his neighbour as well, and will have the satisfaction of knowing that he has been of some use to the country in which he lives.—Yours, etc.,

WIL. F.

Middelburg District, November 14th, 1907.

Duration of Kraal Infection for Scab.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your issue of this month (November) there are five paragraphs having reference to the above subject. I very much regret to hear that some farmers burn their kraal manure. If they burn it for fuel for domestic or other necessary purpose, no fault could be found, but to do so merely to get rid of it is a senseless waste, and no benefit to any one or for any purpose. What the farmer should do is to utilise the manure by spreading it over his lands and plough it in, or dig it in, whether he intends to plant or sow or not the land. He might grow grass on such land if he does not want to use it for other agricultural purposes. If he cannot utilise in this manner in one year all the manure of his kraal he should enclose the kraal so as to keep sheep and goats out till all the manure has been removed and put under ground. Even then the kraal should not be used till it has been dug or ploughed over, according to the nature of the soil, and should be left unused and enclosed for at least twelve months. If the kraal cannot be dug or ploughed, it should be kept fenced for many years before allowing sheep and goats to occupy it.

Digging the manure over in the kraal does not remove the germs of scab. *By leaving the manure and not using the kraal for 20 years does not get rid of the scab either.* The manure is useful for the land, and should be used for that purpose only. Every kraal ought to be thoroughly cleaned of all manure at least once every 12 months, and the manure, when so removed, be at the same time spread on the land and be ploughed in. There *is absolutely no means of getting rid of scab in manure but by ploughing the manure into the soil* When I was a much younger man than I am now a friend had five farms, each of a different kind of grazing, and also on each ran goats and sheep, besides horses and horned cattle. For thirty years he tried every conceivable means to get rid of scab from the effects of kraal manure on the different farms, and the *only effectual remedy was to plough it into the lands*, even though he never used all such land for agricultural purposes. The result was he got rid of the scab, and his lands were enriched with luxurious grass. *Abandoning a manure heap is no remedy against scab even though it be left unused for ever so many years.* Every flock of sheep and goats which must be kraaled, for whatever reason, must have two kraals, six months in the one and six months in the other, and each kraal should be thoroughly cleaned once or twice a year, and when so cleaned dug over and not be used for a few months. Your kraals will then always be sweet and clean and free from scab germs. If you don't attend to these matters as here indicated, then all your remedies for scab would be fruitless if the animals have to be kraaled. Of course, it is otherwise when they are not kraaled But even a "leg-plek" sleeping together on the same spot every night is as objectionable as a fenced kraal.—Yours, etc.,

SOUTH AFRICAN.

Cape Town, November 26th.

Fruit-Growing on Kaffrarian Coast.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—There is a notice published in the *Government Gazette* of 5th inst., signed by Mr. Hannon, embodying lists of certain sorts of fruit—pears, peaches, nectarines, plums (Japanese and European), grapes, etc. Would anyone having practical experience of fruit-growing in East London and Komgha coastal area—say not more than seven or eight miles inland—kindly state what success has attended their efforts in growing any of the above classes of fruit? I have seen excellent peaches (Grosse Mignonne, I think) as well as grapes (Black Hambro') from Mr. W. A. Edmonds' farm, at Ewanrigg, about six miles as the crow flies from the sea shore; the common seedling peach or St. Helena does also fairly, but not of best quality, so far as I have seen. What are the results, along the same coast zone, of growing the oak, walnut, beech, elm, and similar hardwood trees? Farther inland, and at higher altitude in East London and Komgha, the apple and pear succeed well enough; the Citrus tribe does everywhere well.—Yours, etc.,

A. D.C.

Komgha, 8th November, 1907.

The Valuation of Farm Properties.

To the Editor, AGRICULTURAL JOURNAL

SIR,—A very important and far-reaching question is asked in your September issue by the Tentkop Farmers' Association, and I am a ltitle surprised no reply is forthcoming in the October number. On the valuation of farm properties so much depends. Suppose you want to sell or mortgage, Divisional Council valuation is the basis: If you want to borrow from the New Land Bank you can only borrow two-thirds Divisional Council valuation I maintain that these bases are wrong, and act injuriously to the development of the agricultural industry D.C. valuation is just for taxation purposes when it values (*a*) unimproved ground values; (*b*) unproductive improvements; when it includes dwelling-houses and farm buildings only; but if by "shops" the Tent Kop Farmers' Association mean structures for trading purposes (buying and selling) naturally they would be liable for taxation on a separate basis; (*c*) by productive improvements, I take it simply to mean "stock-in-trade," including fencing, irrigation works, machinery, gardens, orchards plantations, stock, crops and necessary plant to make produce marketable

This, I agree with the T K.F. Association is analagous to the "stock-in-trade of a merchant," is never included in town valuation, and should not be subject to taxation.

A basis of valuation should be laid down by law to guide the valuer; so much per acre, according to situation, and its capability for productive improvement, just the same as an erf of land in a town is valued according to situation, and a building at actual value.

The stereotyped question, if you object to the valuation. Will you sell your farm for the valuation? is just as silly, as if a merchant was asked, would he include his stock-in-trade at the valuation of land and building: he might be a diamond merchant in a shanty with two rooms A 2,000 acre farm may be valued at 10s an acre, including homestead, and yet "stock-in-trade" be worth £20,000 to one man, and to another not worth £2,000; but basis of transaction is the same exactly Market value of property is not a basis for taxation, for what to-day may mean a fair price, next year may be vastly too much or too little.

It is too risky to leave the basis of valuation to Divisional Courts, which are too frequently ruled by one strong man. An equitable basis should be settled by farmers in Congress and Government requested to incorporate the decision in a Statute.—Yours, etc.

W. GOULDEN

Egerton, 8th October, 1907.

More Monster Eggs.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the October issue of the *Agricultural Journal* there appeared an account of a brobdingnagian egg, produced by a hen belonging to Mr. G. H J. Schurr, of Sunninghill Road, Wynberg. A reproduced photograph of the phenomenon accompanied its description, according to which the egg measured 9 inches over its longer and 7¼ inches over its shorter circumference, while the weight was given as a fraction over 6¼ ounces. This is certainly a very creditable performance: but, so far as this particular hen is concerned, it seems to have been unique. The editor of the *Journal* asks whether any of his readers can inform him whether the egg in question constitutes a record for size and weight I am not in a position to answer that query; but I can give details of the performance of another fowl, which, though she cannot challenge the Wynberg bird as to the size and weight of her production, can at least claim to beat her in point of consistency. There is at present on the farm Brakboschpoort, about midway between Prieska and Kenhardt, belonging to Mr. C. F. W. Jeppe, J.P., a hen, which, for some time past, has been regularly laying eggs of dimensions nearly approaching those attained by Mr. Schurr's bird. The exact measurements of the Brakboschpoort eggs are 8 inches over the length by 6⅝ inches over the breadth. The weight I was unfortunately unable to ascertain, having nothing between a small grain chemical balance and the wool scale; but I should put it down at close on 6 ounces. The hen which produces these whoppers—they are not silly-season newspaper whoppers, be it observed—is an ordinary-looking black plebeian of the barndoor persuasion, and is said to have made her way to Colonial territory, in some unexplained manner, from German South-West Africa. In the ordinary way, she resides at an out-station, but taking an unforeseen drive to the homestead the other day—in the

cart-box—she carelessly deposited an egg there, and thus her previous performances in the way of laying big 'uns came to light. The eggs are, it appears, single-yoked ones, and a batch of them is now in process of incubation under another hen. The author of this wonderful performance gives herself no airs in consequence, but seems to look upon it as a mere matter of course and all in the day's work. She has had no special feeding or other favoured treatment, being apparently quite content to pick up her living in the same way as her less productive companions. The result of the setting now in hand is looked forward to with much interest, and will be communicated to the *Journal* in due course.—Yours, etc.,

W. T. E.

Prieska, November 9th, 1907.

Another Monster Egg.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to Mr. G. J. H. Schurr, through your *Journal*, *re* the monster egg laid by a White Leghorn, we have one laid by a Black Minorca measuring 3½ inches long with a circumference that way of 9½ inches with a width of 2½ inches and a fraction, the circumference being 8 inches. It is an egg within an egg, the inner one being hard shelled and in perfect order. We still have same on hand (but somewhat patched, the shell being so brittle) which can be sent at any time for your inspection.
Would also like to know if this is not the record.—Yours, etc.,

T. H. MARSHALL.

Stormberg, November 15th, 1907.

The Divining Rod—Remarkable Evidence.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have read with great interest the communication on the above subject by Mr. Frank Biggs, Brooklyn, Graaff-Reinet, July 16th, 1907. The divining rod has many enemies not in South Africa only but in Europe also, especially among the most learned engineers and other scientific gentlemen. However, facts cannot be explained away, sceptics may try ever so hard. The Rev. Pastor F. v. Bodelschwing, of Bethel, near Bielefield, in charge of a very large Sanitorium, where thousands of sick folk find a home and shelter, writes as follows :—

. . . . After we had already spent about 10,000 marks (£500) for deep well-sinking, and had bored to a depth of 200 metres and more and no water, we had a visitor here who advised us to apply to a gentleman farmer and for many years a member of the Legislature, a nobleman by the name of Bülow. He would tell us the right place where to bore for, and also in what depth we would find water. We shook our heads in unbelief, but could not disregard the advice of our friend. We applied to Herr von Bülow to help us, and he and his lady came to see us for a few days. We took him at once to the borehole, but he said it was the wrong spot to bore and no water, or at most very little, would be found there. How could he know this? He pulled out of his pocket a piece of thick iron wire about 2½ feet long, bent in the middle, the two ends grasped by his hands, while the bent middle stood vertical from his body. He then began wandering about the place. All at once it was seen that the middle of the rod moved to and fro, one time more and another less upwards to his body. He said, "here is water, but not enough, when suddenly as we were walking through a small grassy hollow the rod struck violently against his chest. "*Here exists a good spring*," Mr. Bülow said, "we will now see where it comes from and where it flows to." He then moved to the right and again to the left, and in the direction to which the rod moved strongest he indicated with certainty the course of the subterranean water-course. "Now let us see how broad it is?" He then turned at a right angle to the by him ascertained direction of the water-course, first to the right, then to the left, and walked slowly forward and said to us: "This stream is very broad." He fixed the breadth of the stream at 10 metres=31 feet. "Now let us also see how deep it flows from the surface? He turned again at a right angle to the water line. The rod remained quiet (up to 13½ metre from the middle line), when

it again moved violently upward, when Mr. von Bülow said: "The spring flows 26 to 27 metres under the surface of the ground. You will find certainly water here at 80 feet." He investigated the spot again the following day and verified his statements. We began to bore at once, and through a layer of rock, in which, according to the opinion of experts in so little depth no water could be found, and behold in exactly the indicated depth a glorious stream of water came to within 1½ metre of the surface, giving about 4,000 buckets per day, and high enough to work without any pumping arrangement being required. Now, the shaking of our heads in unbelief came to an end. We were conquered by ocular demonstration. Our friend showed us on this and the following day more places where water could be found, and at so little depth.

But how does Herr von Bulow explain his wonderful and marvellous experiences? He is quite certain that all is accomplished through electric agency. It is well known that lightning is attracted through underground waters—for this reason are the lower ends of a lightning conductor placed in moist ground. If this is electricity, so it is morally certain that every subterranean water-course in its total length sends three electric currents upward, the strongest perpendicular one into space, a second and a third at an angle of 36·6° (degrees) toward the right and also to the left. The distance of the two side currents on the surface is exactly equal the depth of the location of the water-course. Herr von Bülow has proved this in more than a hundred cases.

When our friend was searching for water in the valley called Ebenezer at our oldest station, he found at first only small springs, but suddenly walked up to an old plum tree, and as he used his rod it gave at once a strong knock against his chest. "Here is situated a strong spring," he said. "Do you know how I could see this beforehand? Look at the plum tree and compare its miserable growth with its neighbour. It seemed to me probable that a water spring existed below it. All plants, trees, shrubs, rosebushes, etc., suffer in their growth if planted above water-springs, even at a considerable depth. The rising electrical current cripples them in their growth. Fruit trees may blossom, but will not set their fruit." He pointed in the dwarfed growth the course of the water stream, which was only 60 feet under the surface of the soil. In the garden attached to my Parsonage stands a pear tree now 30 years old, which blossoms every year, but does not bear at all. I took our friend to the tree, and the rod at once pointed to a water-spring, and we cut the tree down forthwith. Garden owners and horticulturists may hereby learn to avoid planting upon known underground watercourses. Yet another illustration which is still more important. We came in our garden upon a young fruit tree, which sheweth, by the stripes of bark torn off from top to bottom, that it had been struck by lightning. Herr van Bülow said at once: "Under this tree is a water-course, and not only one but two; which cross here at this spot." And behold the rod showed at once not *one* but *two* water-courses. In my Parsonage garden stood close to the verandah of the house a Redthorn (probably Crataegus orientalis Pall., called by the English "The Eastern Thorn," 15 to 18 feet high). A flash of lightning struck this tree and split it up entirely, although the high lightning conductor of the adjoining house of the diaconesses and the gable of our house were considerable higher points. Herr von Bülow made an investigation and found that two water-springs were crossing one another under the thorn tree. He told us that he had experienced this more than a hundred times in his own forests. All trees which show marks of the lightning stroke have a water-spring underneath them. People should be careful not to build houses over a spot where water-springs exist. Where such do not exist no lightning conductor need be erected.

Yet another point needs mentioning which Herr von Bulow wishes to emphasise, *vide*: There exist many causes of sleeplessness, also such as cannot be traced in any ordinary way. Should your bed stand immediately above an electrical current which is not kept back by any stone or wooden floor nor ceilings you may suffer a restlessness and excitement which can not be overcome by any means. Herr von Bülow has proved this. Herr von Bülow gives his services free gratis and for the benefit of mankind.

The above I have translated from the German by Rev. Pastor F. von Bodelschwing, and I may add that Herr von Bülow has met with small thanks from the Chief Engineer at the naval port of Kiel, and has even there found water close to the Quais. As stated above, he carries an iron rod, while his son, who appears to be weaker, a walnut rod only. As far as I can learn, the divining rod is at work in German South-West Africa, and it is hoped that very many springs and underground streams may be found there.—Yours, etc.,

C. C. Henkel,
late Conservator of Forests,
Hon Secretary and Treasurer,
Tembuland Agricultural Society.

Umtata, November 20th, 1907.

The Divining Rod—A Challenge.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your last (November) number is a letter from a correspondent who signs himself "Another Sceptic." He condemns the wand workers, I take it, because they cannot explain the why and wherefore of this "absurd superstition," and wishes you to exclude the subject from the pages of the *Agricultural Journal.* Also a letter from Mr. Edgar H. R. Evans, who proposes that someone should make a public demonstration at the next Port Elizabeth Show. Now, Sir, I am willing to send my son, a lad of 14 years of age, to the P.E. Show, if the Town Council will help him by having some of the street water pipes open and some closed, and he will show where every pipe is that has running water in it. Standing water the wand will not work on. The test can be checked by having pipes opened or closed as often as may be desired, and he will always show where running water is. But what Mr. Evans means by his last paragraph about mysterious and unknown forces is beyond my comprehension. All I know and all my son knows is that the wand will work where running water is underground.

And I repeat the words to Mr. Evans, quoted by one of your correspondents there are more things in heaven and earth than is dreamt of in his philosophy. Your correspondent "R.J M.C." quotes Scripture which, to my idea, does not bear on the subject. Moses was told to smite the rock and the water gushed out. My son will show where running water is, but you must use crowbar and pick to get it out.

I may just mention that my son has never been in Port Elizabeth.—Yours etc.,

JOHN M. BOWKER

Cossackpost, Rosmead, November 11th

Water-Finding with the Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Having read the letter of "Another Sceptic," and his reference to Mr. Francis, who, "like Mr. Biggs," has "the welfare of the country at heart," I feel it my duty to give your readers a few facts, and to let them judge for themselves.

More than a year ago, a friend of mine, divining-rod in hand, walked all over the ground about my house. I smiled at his simplicity, but was nevertheless a little disappointed at his verdict of "No water." For, although my friend does not pretend to know much about this business, he has proved to be "sensitive" to the presence of an underground stream.

About five months ago, the Catholic priest, to whom "R.J.M.C." refers, was on a visit to my place. In fun, I asked him to find some water, or rather to give a demonstration with the divining-rod, to which the kind father acquiesced good humouredly. I had never seen the divining-rod used, and I had but little faith in it, although I was not a "Sceptic." Myself and three other gentlemen followed the proceedings. For some time we walked over a fair stretch of ground, crossed fences and bush; but the rod remained "inflexible," while the jovial Father took our jokes in good part. But all of a sudden there was something. The rod was moving, and the verdict was: "Water at 60 feet." We all tried the divining-rod. Two were "sensitive," or, at least, thought they felt something, and two, myself included, were absolutely "insensitive." But I hurry to say that I did not yet consider myself a "Sceptic." This demonstration terminated with a joke and a smoke.

The matter, however, did not end there. It was resolved to have another experiment, and this time the Father discovered an underground stream, and distinctly described its course, indicating a spot, quite close to the house, where water would be found at a depth of between 35 and 40 feet. A peg was solemnly driven in to mark the spot. I little thought of digging for water, but during my absence my children and their nurse started and dug a hole about five feet deep. Their labour was not lost, because I could make use of this hole for storing rain-water, which during storms accumulates at a few feet distance. Two months later, in order to give work to a poor man, I let him deepen this hole, and being surprised at his progress, I resolved to give the divining-rod a test. The work was rapid and easy until we reached the rock and were thus seriously checked. But *there* also was the first sign of moisture, and with renewed courage I set to cut through the stone with hammer

and chisel. At 38 feet we came to very hard rock, where the hammer and chisel are useless. *But here, through two parallel fissures, clear water is bubbling into the well,* and rises to a height of 3½ feet.

The father does not make a business of water-finding. He has different and more important work to do. But I am told that there are men who do make a business of finding water, and who know how to find it. To propose that such men should demonstrate on the Port Elizabeth Show-ground is, I think, very impracticable, not to say absurd; and the suggestion of "Another Sceptic" is, in my opinion, very much against the welfare, if not of the country, at least of many individual farmers. -Yours, etc.,

JOSEPH C. POWELS.

Dunbrody, C.C.

The Prevention of Seepage.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Can you, or any of your readers, suggest a cheap way of home-made piping or paving a furrow so as to put a stop to the tremendous loss of water, in an ordinary furrow having to run a long distance, by soakage. Of course, piping would do, but this runs into a large expense. I think many farmers have no idea of the tremendous loss through soakage.—Yours, etc.,

WINDMILL.

Tafelberg, 30th November, 1907.

The most inexpensive method of preventing seepage into the banks of furrows is to lay down a simple form of fluming. This can be done by using ordinary sheets of galvanised iron—either flat or corrugated—and bending them lengthwise to form a half circle or thereabouts. Laid end to end and well joined together, they form an admirable flume, and waste little or no water. Paving, concreting, or piping are expensive items. Even galvanised iron is costly if any distance has to be covered.

Incubating Ostrich Eggs.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Would any ostrich farmer kindly answer the following question? In incubating ostrich eggs, I find if I regulate my machine to give 103° that the eggs are burnt within the first fortnight, hence a failure; if I fix it at 98°, I find that it takes 50 days, and sometimes longer, to hatch the eggs, and yet the chicks come out strong and healthy.

What would be the right heat to give in order to get the chicks hatched in 42 days, or within a reasonable limit of same? Any information to the point will be gladly received.—Yours, etc.,

J. F. KIRSTEN.

Armoed, Oudtshoorn, November 20.

A Sick Calf.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I should be very pleased if you, or some of your readers, could give me any information regarding the following disease?

About a week ago I noticed a calf about two months of age, which I had been rearing on another cow, suddenly going back in condition, and looking thin and miserable, and refusing to eat grass or green barley. Upon inspection I found that the membrane lining the lips, nostrils, and muzzle were all inflamed, and the skin coming off, also a slight yellow discharge from the nostrils. I at once bathed the sore places with some disinfectant, and gave it a dressing of Stockholm tar, which process I continued

every morning. Three days afterwards I noticed no improvement, so I gave the calf something to clear it out, along with a dose of calomel, which seemed to have stopped the discharge from the nostrils. This is now three days ago. I notice no other improvement whatever, the mouth is still just as inflamed. I see no spot where it could have been bitten by some poisonous thing.

I will be glad if some of your readers could throw some light on the subject. It might be another new-fangled contagious disease.—Yours, etc.,

FRITZ. FRANZEN.

Knysna, November 12.

Caution in Making and Use of Ensilage.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—My reason for having asked Mr. Payne to publish in your *Journal* an account of my losses—due to feeding horses and mules on underfermented ensilage—was to allow others to benefit by my dearly-bought experience.

What I learned by that experience is that ensilage must not be used until it is at least a couple of months old. For the reason that it undergoes a stage in the process of fermentation at which it is one of the deadliest poisons you could possibly give a horse. Since finding this out for myself, I have been told that it is a well-known fact, and that the students at Elsenberg are taught it, but what I would like to know is, whether it has ever been published by the Agricultural Department—which has so strongly advocated the making of ensilage—and whether many of the men who go in largely for ensilage know it? I have an idea that very few farmers do, and that the reason for their not having found it out, is that they have never had occasion to use their ensilage until it is some months old.

My reason for writing this is that I consider Mr. Payne does not make the above sufficiently clear in his report. In fact, his communication is no caution at all, since he attributes my loss to my having fed my animals on "stuff which is not ensilage at all, but wet, mouldy, partially decomposed green forage." Surely no man need be cautioned against doing that.

That the stuff was wet when he saw it I won't dispute, because he examined it in pouring rain, but I thought he understood at the time, that the mouldiness and partial decomposition was due to the pit having been left open and untouched for days. Then it may not have been ensilage when I fed it to my animals, for the reason that it had not yet become such, but it at least had the appearance and smell of good sound ensilage, and differed therefrom only in the matter of being still in the poisonous stage. and that is where the need for caution comes in.

Then, apart from its undergoing a poisonous stage, Mr. Payne says ensilage is at any time a dangerous feed for a horse, and that he knows of a case of a horse, in England, dying from it, showing the same symptoms as mine did. Now, if this has ever been brought to the notice of our dairy farmers, who go in largely for ensilage, I have never heard of it. And how natural it would be for anyone having a valuable stud horse, which cannot run at grass, and wishing to give him a green feed, to give him some of the cow's ensilage, with drastic results.

Re the symptoms in my animals. These were not so vague as Mr. Payne seems to have gathered from my explanation. In every case, the first, and for hours, the only symptom, was paralysis of the tongue, which was very decided. Then, in from 6 to 12 hours after, the animal would lose control of its legs, and die within 24 hours, without the least rise in temperature, and without distension of the bowels, purging, or any apparent pain, a thing we farmers cannot understand, who are accustomed to horses either being purged or blown by unwholesome food.—Yours, etc.,

F. J. VERSFELD.

Moutons Valley, Piquetberg, December 2, 1907.

It is an elementary principle in the saving of green crops by any method, that unless properly cured they contain elements of danger. With silage, this principle is always impressed on the maker by giving the period which the curing process occupies. It is generally accepted that ensilage is ready to feed out when it is so compacted that it ceases to settle. This usually takes about a month.

Suggested Comprehensive Test for the Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have written to the P.W.D., asking their aid, and suggesting a method by which we can put the divining-rod to a thorough test. The object of the test will be to prove that the divining-rod is a reliable instrument, when properly handled, with which to select sites where water *will* be found by boring. Or the converse—that it is a fraud, the outcome of superstition, a mere delusion.

I am adding to this letter a copy of mine to the Public Works Department, in which, after suggesting the test, I ask further that the results of that test—whether for better or for worse—be printed in this *Journal*.

Some may here ask why I do not accept Mr. Francis's suggestion, *re* a test at the Port Elizabeth Show. I reply that it is for the operator to say what he is able to do, as he only knows the capabilities of the divining-rod. Also it is evident that Mr. Francis did not carefully consider my letter before writing, for, in his first sentence he says:—"The August number of the *Journal* contained two distinct references to the divining-rod." There certainly was only one letter *re* divining-rod in the August *Journal*.

Unfortunately, Mr. Francis, in his haste to extract the pith out of my letters, fell to wandering from the exact meaning of several of my statements.

Piecing my letter together, he says: "We arrive at the following assertion:—'That any number of operators with the divining-rod, when blindfolded, could within a foot or so corroborate one another in finding the water mains of a city, providing that the water was flowing at the time in the pipes.'" Mr. Francis comments, "a remarkable contention." I may add that it is a remarkable miscontruction of the few plain statements that I made in my letter. I commenced my letter by limiting it to my personal experience. Then, speaking in proof of my "electric theory," I said "(2) that it (the divining-rod) only acts for flowing water, which I proved by standing on the pipe of a dam with the tap closed, the rod in my hand refusing to work until the tap was opened, allowing the water to flow through." Note, I knew where the pipe was, so I stood immediately above it. Then, leaving the subject of "pipes," I spoke (3) about the kind of rod. Then (4), I stated that "The same spot can be pointed out by different people." I did *not* state that any number of operators could, within a foot or so, corroborate one another in finding *water-mains*. My own experience of different diviners is that they find the same water veins in the same localities. In my next sentence I said that any fair operator could corroborate his *own* work, even when blindfolded, "within a foot or so."

Mr. Egar. H. R. Evans, Grahamstown, considers Mr. Francis's remarks "fresh and sensible." Fresh they certainly are! But I am sure the test proposed for the P.E. Show, as far as water-mains are concerned, would be unsatisfactory, if not impossible. If Mr. Francis could guarantee that the given locality through which the water-main runs, is free from all other underground water, then it would be a simple matter. But in all probability water veins will be numerous, and as each vein has a certain number of attracting points, some not more than three inches in width, it would be only guess work to say which was the pipe and which the vein. So, in event of a failure, to quote Mr. Evans, we would again "beat a retreat to that nebulous realm, solong our harbour of refuge."

If circumstances permit, I will, if requested by the Society, select sites in the P.E. Showyard, by means of the divining-rod, where subterranean water will be found on boring, if such exist. This will give each boring machine entering, a chance of proving its superiority over all other makes. And, should water be struck, it will give windmills entering for future shows, the opportunity of proving their respective merits in actual work.

My proposed test for the divining-rod is as follows:—That through the direction of the P.W.D. I shall visit some of the farmers in the Midlands, who have applied for the Government Drill, and by means of the divining-rod select spots on their farms where water will be found. Or, should the farmer be a sceptic, I will test the spot he selects. I will then send in my report to the P.W.D., who shall keep the report until the drill foreman, in turn, has sent the result of the boring operations; then, through the kind permission of the editor, both shall be printed in this *Journal*.

The divining-rod stands or falls only as water is found or not found in the spots indicated. For, as I said in my previous letter, the divining-rod only acts for a flowing stream. Should water be found where the rod refuses to work, it would prove nothing against the rod.

Should farmers, on reading my letter to the P.W.D., think that I am not asking too much from the Department, and that the terms of the test are convincing, then I ask that in the event of the Department refusing my proposal, that they (the farmers) shall help me by asking the Government to reconsider their former decision.

I am experimenting with the divining-rod, how to find the depth of the water vein, and to what height the water will rise in the borehole. Should any of these experimental figures be proved incorrect, they will not affect the test of the reliability of the divining-rod, for all we claim for the divining-rod at present is, that it is capable, if *correctly handled*, of indicating flowing water, without exception.

In answer to the question of one of the correspondents, why should there be a percentage of failures at all in diviners' results? I reply that the number of attracting points makes it difficult for any diviner, who has not got a clue to their maze, for he may select an attracting point as a water vein—the result would be a failure. Or the fault may be in abandoning the borehole before boring to a sufficient depth. To prevent this latter cause of failure, I would suggest that in event of no water being found in a site indicated by the divining-rod, boring operations shall be continued to a minimum depth of 300 feet.

With apologies for taking up so much space in your valuable *Journal*, and trusting that the result of the test will be a sufficient reward for the patience of your readers.—Yours, etc.,

FRANK BIGGS.

Brooklyn, Graaff-Reinet, November 29.

COPY OF LETTER TO PUBLIC WORKS DEPARTMENT

Brooklyn, Graaff-Reinet,
November 29, 1907.

To the Director of the Public Works Department, Cape Town.

DEAR SIR,—I am writing to ask the aid of the P.W.D. in the matter of testing the reliability of the "divining-rod." After much discussion in the *Agricultural Journal*, it has been the decision of nearly all the writers that it is time that the divining-rod be put to an exhaustive test.

A test has been proposed, but it is not suitable. I am, therefore, submitting the following to the Department, and hope that the matter will have due consideration. I may also say that I am sending a copy of this letter—together with my letter on "Testing the Divining-rod"—to the *Agricultural Journal*.

I claim for the divining-rod that it is a reliable instrument, which can, if properly handled, without exception indicate spots where flowing underground water will be found on boring to a sufficient depth. The object of the test will be to either substantiate my claim for the divining-rod, or to prove that it is a fraud.

To obtain this object I propose to go, through the direction of the Public Works Department, to a certain number of the farmers in the Midlands, who have made application for the Government drills; and by means of the divining-rod, to either test the spot the farmers select, or to select new sites for boring, according to the mind of the farmer. I shall then mark the exact spot for boring operations, and send a report to the Department *re* the water to be found. When the borehole is completed, the foreman in his turn shall report the result, and both reports shall be published in the *Agricultural Journal*.

I now make the following request to the Department:—

1. That the names and addresses of the farmers who have applied for the Government drills in the Districts of Aberdeen, Jansenville, Graaff-Reinet, Murraysburg, Middelburg, Cradock, and Steynsburg be sent to me.

2. That upon receipt of the names of ten farmers whom I shall select to visit, the Department shall communicate with the said farmers, *re* the test, and asking if they are willing to have the test on their farms, and impressing them with the necessity of boring on the *exact* spots I have selected or tested.

3. That the Department, having received my report, shall instruct the drill foreman concerning the subjects on which he is to report. At the same time it is necessary that he be ignorant of the figures of my statement.

4. That although it is most improbable, yet should no water be struck at the usual depth, the Department shall endeavour to continue boring operations to at least a depth of 300 feet. This is important, as the divining-rod stands or falls only as water is found or not in the spots selected. Should water be found where the divining-rod refuses to act, it proves nothing against the divining-rod, as it only works for running water.

5. That on receipt of both reports (the one made before the boring operations, and the other an actual statement of the result), they shall, with the kind permission of the Editor, be published together with this letter in the *Agricultural Journal*.

If the Public Works Department accept the above as their part of the test, I will follow the conditions I now make for myself.

1. That upon receipt of the names and addresses of the farmers, and having made my selection, I shall at my earliest convenience, in the year 1908, visit these said farmers, to either select sites for boring, or to test the spots which they have chosen

2. That two shall be the maximum number of spots selected (by means of the divining-rod) for boring operations on any one farm, and these shall be well marked and numbered.

3. That ten shall be the minimum and twenty the maximum number of spots selected by means of the divining-rod, and subjected to the test.

4. That I shall be permitted to experiment in private, at the spots I have selected as water veins, *re* the depth at which water will be found, and to what depth from surface it will rise in the borehole when struck (providing it finds no empty crevice by which to escape before it reaches the stated level). That these experimental figures shall be added to my report, but that should any of them prove incorrect it will not affect the test, as the divining-rod only claims, for the present at least, to be able to point out flowing streams of subterranean water, and in this only it must not fail.

5. That I shall pay my own travelling expenses; though, at the same time, a free pass or even a reduction in the ordinary train fare for myself and my horse would be gratefully accepted, though not expected.

6. Should any borehole be abandoned through loss of tools, hardness of rock, sand, etc., the same shall not be taken into consideration as proof for or against the divining-rod.

7. Should more than two boreholes, where the divining-rod indicated water, be failures, let the divining-rod be pronounced a fraud.

8. Should all the sites selected as water veins be found correct, then shall the divining-rod be considered a reliable instrument, etc.

I hope that the Department will be able to help us in the test, as I am sure that the ends to be gained, supposing the rod be proved reliable, will more than justify the means proposed.

Moreover, I believe it to be the desire of many of the farmers of this Colony that this mystery should be either proved correct or condemned as a fraud.—Awaiting your reply,

I am, Dear Sir,

Yours faithfully,

FRANK BIGGS

An Unusual Occurrence.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The other day, when shearing my merino ewes, one of the shearers pointed out a teat growing on the bare skin on the chest on the left side. The teat was nearly on the border of the wool line, and practically in the same position as a monkey's teat is. It was quite hidden by the ear shoulder until sheep was turned up for shearing. Is not such an occurrence very unusual?—Yours, etc.,

DORDRECHT.

Paspalum Grass.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your November issue, on page 501, I note you state:—"That very favourable reports are to hand of its successful growth wherever it has been tried."

I should be glad to hear whether you know of anyone who has tried it successfully in the Wodehouse or Barkly East districts.

I sowed 100 lb. seed two years since, and am very dissatified with it. I was told that no frost affected it, but I find that a slight frost kills it back. I consider our common winter grass is far superior to it, and one acre of lucerne (on dry lands) is worth 20 acres paspalum.—Yours, etc.,

HAROLD T. SILLS.

Dordrecht, December 2.

Lincoln-Merinoes.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to inquiry made by "Farmer," of Beaufort West, on page 590 of your November issue, I would strongly advise him *not* to try Lincoln cross, particularly on the Karoo. I had about 1,000 of them, and got rid of them all, as I found that if we got a slight drought, they fell off quickly, though under *favourable* conditions they did better than merinos. They are naturally a heavy sheep, and as they did not do well in our thickly-grassed district, I think it almost certain they would not do on the Karoo. They are demons for getting through fences; they are nearly as bad as Boer goats.—Yours, etc.,

SHEEPFARMER.

Dordrecht, December 2.

Burnt Veld and Young Stock.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—"Enquirer" asks, in the latest *Journal,* what effect young-grass of burnt veld has on sheep ewes and goats; that they are liable to throw dead lambs. My opinion is, not that there is danger in the young grass, but in the remains of the veld burning, as ashes and partly burnt grass, etc. Why does not other young grass cause any harm? Keep the stock a little longer from the burnt veld, that the grass may grow longer, so that ashes and half-burnt grasses cannot so easily be eaten.—Yours, etc.,

BOER.

Clanwilliam, November 22, 1907.

NOTES ON THE WEATHER OF OCTOBER, 1907.

By Thomas W. Rees, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

An abnormally high mean atmospheric pressure, a percentage of cloud higher than usual, some heavy winds, unusually severe frosts, causing considerable damage to fruit, potatoes and crops; very unsettled, variable weather; several falls of snow and a deficiency of rainfall were the chief characteristics of the weather of October.

Division.	Mean Rainfall (1907).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	2·90	14	2·78	8	+0·12	+ 4
South-West ...	2·02	10	1·73	6	+0·29	+17
West Coast ...	0·73	8	0·80	4	—0·07	— 9
South Coast ...	2·96	9	2·26	8	+0·70	+31
Southern Karoo ...	0·60	2	0·91	4	—0·31	— 34
West Central Karoo ...	0·57	2	0·62	2	—0·05	— 8
East Central Karoo ...	0·34	3	0·66	3	—0·32	—50
Northern Karoo ...	0·43	2	0·78	2	—0·35	—45
Northern Border ...	0·49	3	0·62	2	—0·13	—21
South-East ...	1·09	7	2·45	8	—1·36	—55
North-East ...	0·79	5	1·51	4	—0·72	—48
Kaffraria ...	1·45	9	2·64	8	—1·19	—45
Basutoland ...	2·73	12	2·34	6	+0·39	+17
Orange River Colony...	1·56	7	1·42	3	+0·14	+10
Durban (Natal) ...	4·56	16	4·46	...	+0·10	+ 2
Bechuanaland ...	0·91	6	1·04	4	—0·13	—12
Rhodesia ...	1·32	6	0·72	3	+0·60	+83

Precipitation.—The rainfall during the month amounted on the mean of 362 stations to 1·36 ins. falling on 7 days, being 0·54 ins. or 28 per cent. less than the average. It was only over the Cape Peninsula, the South West, the South Coast, Basutoland, Orange River Colony and Rhodesia that the rainfall was above the average. The deficiency was greatest over the South-East, the North-East, Kaffraria, the Northern Karoo and the Southern Karoo, amounting respectively to 1·36 ins. or 55 per cent., 0·71 ins. or 48 per cent., 1·19 ins. or 45 per cent., 0·35 ins. or 45 per cent., and 0·31 or 34 per cent. The amount of rainfall over the remaining divisions was only a little above or below the normal. Summarising the monthly totals it is found that only 9 stations reported "Nil," though 106 stations had a rainfall of only 0·01—0·50 ins. Of the remainder, 78 had 0·51—1 in.; 77 had 1·01—2 ins.; 41 had 2·01—3 ins.; 19 had 3·01—4 ins.; 12 had 4·01—5 ins.; 10 had 5·01—6 ins., and two stations had a rainfall exceeding 6 ins., viz., Edinburgh, near Knysna, 6·89 inches, and Concordia, also in the Knysna district, 6·23 ins. The maximum amounts recorded in 24 hours were generally small, as many as 217 reporting maxima of under 0·50 ins. Of the remainder, 95 had between 0·51—1 in.; 23 had between 1·01—2 ins.; and four had over 4 inches. These were all stations on the South Coast, viz., Lottering, with 2·27 ins. on the 5th; Witte Els Bosch with 2·20 ins. on the 4th; Blaauwkrantz with 2·17 ins. on the 4th; and Buffel's Nek with 2·12 ins. on the 5th.

The number of *Thunderstorms* reported was almost exactly double that during the previous month, 237 occurring on 25 days, by far the greatest number of these taking place on the 1st and 12th. *Hail* fell on 15 days, principally on the 23rd and 28th. *Snow* fell at 9 stations on 4 days, chiefly on the 5th, the ground being white on that date at Buffel's Nek and at Zwartberg Pass on the 25th. *Sleet* is only reported to have occurred at 5 stations on 3 days.

Temperature, Cloud and Wind.—The mean monthly temperature of all stations was 59·9° or the large amount of 3·3° below the average, and only 2·1° higher than the mean temperature for September. The month of October, 1903, and this month were the coldest for several years, the former with a mean temperature of 59·6°, and this month with 0·3° higher. The mean warmest station was Hope Fountain, with 68·7°, while the coolest station was Disa Head, with 50·5°, a difference of 18·2°. The mean maxima ranged from 57·4° at Disa Head to 82·6° at Kimberley, while the mean minima varied between 56·8° at Port St John's and 40·8° at Hanover. The mean value of the absolute maxima was 88·4° and of the corresponding minima 38·3°. There was therefore a mean monthly range of 50·1° or 3·4° less than during the previous month. The highest temperature of the month was 100·3° recorded at Main, in Tembuland, on the 16th, and the lowest 26·0° on the 6th at Hanover, an extreme range of 74·3°. *Frosts* were reported from 25 stations on 20 days, mostly over the West Central and Northern Karoo, the South-East and North-East. These were most common on the 6th and 19th. These frosts were in several instances unusually severe for the time of the year. Thus at Huxley, in the Stutterheim Division, it is reported that the frost on the night of the 18th killed a good many lambs. At Thibet Park, in the Queenstown Division, the frost on the 5th, 6th, and 7th killed all fruit and much of the crops, whilst further frosts on 18th, 21st left nothing further to kill. These, unfortunately, are not isolated instances of the damage done, for several other observers report in a similar strain.

The mean pressure at the Royal Observatory was unusually high, being 30·143 ins., and curiously enough the mean pressure was the same at Durban (Natal). This high pressure was accompanied by a high percentage of *Cloud* (54 per cent.), which was 12 per cent. more than usual. The greatest excess of cloud was over the West Coast, where it was 29 per cent more than usual, over the Northern Karoo, where it was 15 per cent. more, and over the South-West, where it was 14 per cent more thna usual. *Fogs and Mists* were slightly more numerous than during September, being reported from 151 stations on 28 days, most numerously from the 2nd to 4th and 28th to 30th. The mean *Wind-force* for the month was 2·55 on the Beaufort Scale, corresponding to a mean velocity of 15·7 miles per hour. The prevailing morning winds were South-Easterly at Port Nolloth and over the Cape Peninsula, and Westerly along the South and East Coast, and South-Westerly at Durban. Over the greater part of the interior the winds were South-Easterly. The wind attained the force of a *Gale* at 60 stations on 25 days, these occurring most frequently on the 12th and 13th. *Hot Winds* were only reported from 2 stations on 2 days. *Duststorms* occurred at 10 places on 9 days.

TEMPERATURE, OCTOBER, 1907.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	68·6	52·8	60·7	87·5	31	46·9	25
Cape Town (S.A. College) ...	68·7	52·6	60·6	90·4	31	45·0	18
Wynberg ...	69·4	50·4	59·9	87·0	1	42·5	25
Simonstown ...	68·9	55·0	62·0	83·1	1	47·8	18
Devil's Peak ...	63·1	46·5	54·8	86·0	31	39·0	18
Table Mountain (Disa Head)	57·4	43·7	50·5	78·9	31	35·0	30
Groot Constantia ...	66·0	50·9	58·5	83·0	31	42·0	24
Wellington (Hug. Sem.) ...	73·0	51·7	62·4	89·0	2	41·3	19
Groot Drakenstein ...	70·9	50·8	60·8	92·6	31	42·2	6
Danger Point .	64·0	51·5	57·8	76·0	30	45·0	7 & 19
Ceres ..	71·2	42·7	56·9	86·0	30	30·0	19
Elsenberg (Agri. College) ..	70·2	47·7	58·9	91·7	31	34·3	25
Port Nolloth ...	73·1	48·2	60·6	97·0	13	41·0	8 & 19
Potteberg ...	69·1	49·6	59·4	86·0	15	41·5	24
Dunbrody ...	78·9	48·0	63·4	96·3	21	32·8	26
Port Elizabeth (Lighthouse)	66·5	53·6	60·0	76·0	2 & 21	46·0	6 & 25
Port Elizabeth (Emerald Hill)	66·4	52·3	59·4	76·0	2	44·0	25
Concordia (Knysna) ...	67·4	50·0	58·7	88·5	1	40·0	6
Cape St. Francis ...	63·9	53·3	58·6	68·0	15	45·0	6
Van Staaden's River ...	68·5	49·9	59·2	85·0	15	39·0	25
Cape Agulhas ...	63·6	53·4	58·5	73·0	1	46·0	19
Heidelberg ...	70·9	49·1	60·0	85·0	14	36·0	6
Amalienstein ...	74·2	47·3	60·7	94·0	1	35·0	25
Murraysburg ...	72·7	42·8	57·8	88·0	21	31·0	5
Hanover ...	73·2	40·8	57·0	88·0	22	26·0	6
Kenhardt ...	80·4	50·2	65·3	96·0	15	39·0	20
Kimberley ...	82·6	50·2	66·4	96·0	22	36·1	19
Lovedale ...	75·5	48·1	61·8	98·0	21	36·0	26
Sydney's Hope ...	68·0	48·1	58·0	90·8	1	38·5	6
King William's Town ...	76·4	50·0	63·2	99·0	21	37·0	18
Bedford ...	72·8	45·1	59·0	95·0	22	32·0	6 & 26
Stutterheim ...	70·6	47·8	59·2	93·8	21	34·0	19
East London ...	67·1	55·7	61·4	74·0	10	47·0	6
Evelyn Valley ...	63·9	44·3	54·1	86·0	21	34·0	6, 19, 25 & 26
Rietfontein (Aliwal North) ..	70·5	43·7	57·1	86·5	22	32·3	6
Mount Ayliff ...	73·7	49·5	61·6	98·0	16 & 22	36·0	6
Kokstad (The Willows) ...	69·3	44·7	57·0	93·0	22	35·0	6 & 9
Main ...	71·3	47·1	59·2	100·3	16	30·0	6
Tabankulu ...	69·8	46·8	58·3	93·8	22	32·8	6
Port St. John's ...	71·3	56·8	64·0	82·0	23	44·0	25
Umtata ...	73·1	49·0	61·0	100·0	16	35·0	6
Teyateyaneng ...	73·7	43·7	58·7	89·0	23	32·0	19
Moyeni ...	74·1	42·5	58·3	90·0	22	31·0	5
Kuruman ..	79·2	48·6	63·9	91·0	23	38·0	9
Hope Fountain ...	81·2	56·3	68·7	93·3	4	49·8	3
Means ...	70·8	49·0	59·9	88·4	...	38·3	...
Extremes ...	...	...	...	100·3	16	26·0	6

OBSERVERS' NOTES, OCTOBER, 1907.

Vogel Vlei.—Wind very nearly the whole of the month.

Bloemhof.—Drought very severe.

New Bethesda.—Severe frosts almost every night. Fruit and vegetable gardens destroyed. Much damage to crops.

Roodebloem.—Stock dams drying up; outlook serious, especially for small stock. Have a good supply of lucerne and American aloes for ostriches, horses and cattle.

Tafelberg Hall.—Dry winds most of the month. Some severe frosts have fallen and cold wind from S.W., which appears to blow off snow; often cloudy and threatening, but no rain.

Theefontein.—Frosts occurred on 6th, 11th, 14th, 19th, 20th, 26th, 27th, and 28th. Ice on two occasions. Weather extremely variable during month, changing from heat to cold almost daily. Winds cold and variable. Locusts about portion of district in small swarms. Very little damage done by them.

The Meadows.—This month has been very dry, with frost nearly every night, doing considerable damage to everything. No signs of rain.

Waverley.—The frost on the 16th was very severe; killed everything.

Douglas.—Sharp frost on 25th, potatoes, grapes, and other fruit injured in places.

Karree Kloof.—No rainfall; mild weather.

Van Wyk's Vlei.—Veld very little improved. Locusts trekking, and trekkers passing in search of pasture. Swarms of bees, a pest. Snakes abundant; the country seems alive with them. A man was bitten a few days ago; is in a dangerous state.

Alexandria.—Crops very bad owing to the absence of rain when badly wanted.

Dagga Boer.—South-East winds, very strong and cold; nights frosty.

Fort Fordyce.—The frost on the 20th killed potatoes, beans, etc.

Huxley.—On the night of the 18th severe frost killed a good many lambs. From a farmer's point of view, this has been a miserable, cold, dry month. No crops in as yet, and the winter oats a total failure, and it is getting late for mealie crops.

Sunnyside (Albany).—Veld very dry. Cattle stock of all descriptions looking poor, likewise the standing grain crops. No mealies have been put in yet. The late snap did a lot of damage to vegetable growers.

Bolotwa.—The sharp frost on 19th took nearly all grapes, and scorched everything tender.

Keilands.—Springs well supplied. Country exceedingly dry. No ploughing possible as yet. Stock in poor condition.

Sterkspruit.—Enormous swarms of "voetgangers" hatching out, but being successfully destroyed by arsenite of soda and sugar. Crops and veld very promising.

Thibet Park.—The frost on the 5th, 6th, and 7th was very severe, killing all fruit and lots of crops. Further frosts on the 1th, 19th, 20th, and 21st left nothing further to kill. Very severe month—summer one day, winter next day. No rain; cold winds and frost; very dry.

Kokstad.—On the 4th a heavy gale of wind passed over the town, breaking branches off trees. Very cold easterly winds, with leaden skies during month. Rain badly wanted for new crops.

Slaate.—On the 13th there was a terrific windstorm due North at 9 a.m., abated somewhat at 2 p.m. and veered to North-West; lulled at 7 p.m. Many trees smashed in exposed situations, and fruit shaken off trees. The weather generally has been very changeable, often promising for rain but very little falling, and that little being quickly dried up by the wind. Consequently crops and veld suffering, but stock doing well.

Groot Drakenstein.—The temperature this month was about normal, the weather windy with frequent light rains, though the rainfall which fell on 13 days only amounted to 2·57 inches or 0·65 inches below the average.

Kokstad (The Willows).—Very variable hot and cold weather this month. Fortunately no frosts have occurred. A fair amount of rain fell.

Carnarvon Farm.—October has been the most disastrous month experienced here in a period of half a century. I subjoin a tabular statement showing the weather vagaries during the month:—

	Rain.	Wind.	Frosts.	Cloudless days.
1901	2·37	6	4	0
1902	0·66	9	5	2
1903	0·92	21	7	0
1904	1·03	16	9	0
1905	1·30	12	3	4
1906	8·63	8	8	0
1907	0·22	17	12	0

The severe frost of the 12th (10°) killed all crops, fruit, including 500 walnut trees, buds and blossoms, a 50 acre field of lucerne standing 9 to 15 inches high,
trees, buds and blossoms, a 50 acre field of lucenre standing 9 to 15 inches high,
which was wethered down and bleached to within 6 inches of the ground had to be mowed fourteen days before due date. Swarms of locusts (voetgangers) passing Eastwards.

RAINFALL, OCTOBER, 1907.

I. CAPE PENINSULA:	INS.
Royal Observatory (a) 12 in. gauge	1·20
Cape Town, Fire Station ...	
Do. South African College	1·70
Do. Molteno Reservoir ...	1·73
Do. Platteklip ...	2·65
Do. Signal Hill ...	1·24
Do. Hospital ...	
Sea Point, The Hall ...	1·32
Do. Attridge ...	
Camp's Bay	1·21
Table Mountain Disa Head ...	1·98
Do. Kasteel Poort ...	4·65
Do. Waai Kopje ...	5·79
Do. St. Michael's ...	5·40
Devil's Peak Blockhouse ...	3·72
Do. Nursery ...	3·20
Do. Lower Gauge ...	
Woodstock, The Hall ...	1·53
Do. Municipal Quarry ...	2·30
Do. do. Nipher's Shield	2·85
Newlands, Montebello ...	5·05
Claremont, Carrigeen ...	3·40
Bishopscourt	4·70
Kenilworth	3·64
Wynberg, St. Mary's ...	4·17
Groot Constantia	4·01
Tokai Plantation	3·32
Plumstead, Culmwood ...	3·08
Muizenburg (St. Res.) ...	
Fish Hoek	
Simon's Town, Wood ...	2·84
Do. Gaol ...	2·33
Cape Point	0·18
Blaauwberg Strand	
Robben Island	0·82
Durbanville	
Maitland Cemetery	1·31
Tamboer's Kloof	1·69
Woodhead Tunnel	4·28
Newlands Reservoir, No. 1 ...	5·54
Do. do. No. 2 ...	5·07
Lower Reservoir	1·95

II. SOUTH-WEST:	INS.
Eerste River	
Klapmuts	
Stellenbosch, Gaol	2·45
Somerset West	2·75
Paarl	
Wellington, Gaol	1·92
Do. Huguenot Seminary	2·30
Groot Drakenstein, Weltevreden	2·57
Porterville Road	
Tulbagh	
Ceres Road	1 45
Kluitjes Kraal	1·51
Ceres	3·02
The Oaks	
Rawsonville	1·07
Caledon	1·96
Worcester, Gaol	1·16
Do. Meiring	
Do Station	

II. SOUTH-WEST (*continued*):	INS.
Hex River	0·81
De Doorns	
Karnmelks River	1·50
Lady Grey, Division Robertson .	
Robertson, Gaol	1·16
Do. Govt. Plantation ...	0·96
De Hoop	1·60
Montagu	1·62
Danger Point	1·78
Vygebooms River	2·62
Elgin Plantation	5·05
Elsenberg Agricultural College	1·88
Berg River Hoek	
Wemmer's Hoek	
Roskeen	2·75
Vruchtbaar	2·51

III. WEST COAST:	INS.
Port Nolloth	0·01
Do. (Lieut. Barber) ...	0·06
Anenous	
Klipfontein	
Kraaifontein	
O'okiep	
Springbokfontein	0·53
Concordia	
Do. Kraphol	0·33
Garies	
Lilyfontein	0·85
Van Rhyn's Dorp	0·85
Clanwilliam, Gaol	0·74
Do. Downes ...	
Dassen Island	0·96
Kersefontein	0·89
The Towers	1·44
Abbotsdale	
Malmesbury	0·77
Piquetberg	1·35
Zoutpan	
Wupperthal	0·86
Welbedacht	
Hopefield, Gaol	1·06

IV. SOUTH COAST:	INS.
Cape Agulhas	2·17
Bredasdorp	2·35
Swellendam	3·09
Potberg	2·71
Zuurbraak	3·57
Grootvaders Bosch	4·15
Heidelberg	1·99
Riversdale	2·58
Melkhoutfontein	
Vogel Vlei	1·74
Geelbek's Vlei	
Mossel Bay	1·98
Great Brak River	2·17
George	3·88
Do. Plantation	3·63
Do. Woodifield	
Ezeljagt	

IV. SOUTH COAST (*con.*):

Station	Ins.
Millwood	3·49
Sourflats	3·02
Concordia	6·23
Knysna	5·14
Buffel's Nek	4·89
Plettenberg Bay	3·56
Harkerville	...
Forest Hall	...
Blaauwkrantz	5·34
Lottering	5·32
Storm's River	...
Witte Els Bosch	5·28
Humansdorp	4·01
Cape St. Francis	3·50
Hankey	...
Witteklip, Sunnyside	1·94
Van Staden's, Intake	1·92
Do. On Hill	1·65
Kruis River	0·54
Uitenhage, Gaol	0·53
Do. Park	0·39
Do. Inggs	...
Armadale, Blue Cliff	0·26
Dunbrody	0·28
Port Elizabeth, Harbour	2·79
Do. Victoria Park	...
Do. Walmer Heights.	3·64
Shark's River, Nursery	2·89
Do. Convict Station	2·62
Tankatara	...
Centlivres	0·20
Edinburgh, Knysna..	6·89

V. SOUTHERN KAROO:

Station	Ins.
Verkeerde Vlei	...
Bok River	...
Triangle	...
Touws River	...
Do. D.E. Office	...
Pietermeintjes	...
Grootfontein	...
Ladismith	1·32
Amalienstein	0·85
Seven Weeks' Poort	...
Calitzdorp	0·58
Oudtshoorn	0·67
Vlakte Plaats	...
Uniondale	0·80
Kleinpoort	0·00
Glenconnor	0·00
Rust en Vrede	...

VI. WEST-CENTRAL KAROO:

Station	Ins.
Matjesfontein	...
Laingsburg	...
Prince Albert Road	...
Fraserburg Road	0·43
Prince Albert	0·90
Zwartberg Pass	2·55
Booi's Kraal, Beaufort West	...
Beaufort West, Gaol	0·10
Dunedin	0·45
Nel's Poort	0·41
Camfers Kraal	0·29
Lower Nel's Poort	...
Krom River	0·43
Baaken's Rug	...
Willowmore	0·40
Rietfontein	...
Steytlerville	...
Lemoenfontein	0·12

VII. EAST-CENTRAL KAROO:

Station	Ins.
Buffels Kloof	...
Aberdeen, Gaol	0·40
Do. Bedford	...
Corndale	...
Aberdeen Road	...
Klipplaat	...
Winterhoek	...
Klipdrift	...
Kendrew. Holmes	...
Do.	...
Graaff-Reinet, Gaol	0·45
Do. Eng. Yard	0·49
Do. College	...
New Bethesda	0·28
Roodebloem	0·21
Glen Harry	0·17
Wellwood	0·13
Do. Mountain	0·33
Bloemhof	0·08
Jansenville	0·30
Patrysfontein	...
Bethesda Road	0·26
Afrikander's Kloof	...
Roode Hoogte	0·00
Toegedacht	0·24
Klipfontein	0·29
Cranemere	0·08
Pearston	0·35
Darlington	...
Walsingham	...
Arundale	...
Doornbosch, Zwagershoek	...
Middlewater	0·43
Somerset East, Gaol	1·99
Do. Do. College	...
Longhope	...
Cookhouse	...
Middleton	...
Spitzkop, Graaff-Reinet	0·37
Bruintjes Hoogte	...

VIII. NORTHERN KAROO:

Station	Ins.
Calvinia	0·97
Middlepost	...
Brandvlei	...
Onderste Doorns	...
Sutherland	1·20
Fraserburg	0·10
Scorpions Drift	...
Rheboksfontein	...
Klein Vlei	...
Carnarvon	0·71
Loxton	...
Beyersfontein	...
Wagenaars Kraal	...
Brakfontein	0·31
Victoria West	0·84
Omdraais Vlei	...
Doornkuilen	...
Britstown	0·45
Wildebeestkooi	0·46
Murraysburg	0·40
De Kruis, Murraysburg	0·40
Richmond	0·75
De Aar	...
Middlemount	...
Hanover	0·48
Theefontein	0·36

VIII. NORTHERN KAROO (*con.*):

Station	INS.
Zwagersfontein	
Philipstown	0·25
Boschfontein	
Petrusville	0·88
The Willows, Middelburg ...	0·34
Naauwpoort	0·41
Middelburg, Gaol	0·18
Do.	
Middelburg Government Farm ...	
Jackalsfontein	0·50
Ezelpoort	0·48
Plaatberg	0·28
Grape Vale	0·56
Ezelfontein	0·21
Roodepoort	0·23
Groenkloof	0·36
Vlakfontein	0·30
Vogelsfontein	0·50
Plaatfontein	0·35
Colesberg	0·25
Tafelberg Hall	
Rietbult, Colesberg Bridge ...	
Fish River	0·10
Varkens Kop	0·12
Culmstock	
Droogefontein . ..	
Stonehills	
Cradock, Gaol	0·15
Witmoss	0·45
Varsch Vlei	
Maraisburg	0·25
Steynsburg, Gaol	0·36
Riet Vlei	
Hillmoor	
Quagga's Kerk	
Tarkastad	0·48
Do., Dis. Engineer ...	
Drummond Park	
Glen Roy	0·31
Waverley	0·22
Gannapan	
Montagu...	
Grape Vale	
Rietfontein, Cradock ...	
Schuilhoek	0·41
Vosburg	0·61
Zwavelfontein	
Holle River, Colesberg ...	0·67
The Meadows, Schoombie ...	0·21
Cradock Station	0·18
Tarkastad, D.E.	

IX. NORTHERN BORDER:

Station	INS.
Pella	0·36
The Halt	0·00
Keimoes	
Kenhardt	0·95
Upington	0·38
Trooilapspan	
Van Wyk's Vlei	1·28
Prieska	0·20
New Year's Kraal	0·08
Dunmurry	0·34
Karree Kloof	0·00
Griquatown	0·46
Campbell	
Douglas	0·32
Avoca, Herbert	0·00
Hope Town	
Orange River	

IX. NORTHERN BORDER (*con.*):

Station	INS.
Newlands, Barkly West ...	0·41
Barkly West	1·34
Bellsbank	0·52
Kimberley Gaol	1·25
Do. Stephens ...	1·15
Strydenburg	
Rietfontein, Gordonia ...	0·00
Douglas, Vos	0·27

X. SOUTH EAST:

Station	INS.
Melrose, Div. Bedford ...	0·46
Dagga Boer	0·57
Fairholt	0·64
Lynedoch	
Alicedale	
Cheviot Fells	
Bedford, Gaol	1·44
Do. Hall	1·10
Sydney's Hope	1·02
Cullendale	0·80
Adelaide...	0·36
Atherstone	0·77
Alexandria	2·02
Salem	0·00
Fort Fordyce	2·02
Fountain Head	
Graham's Town, Gaol ...	1·08
Do. Do.	
Heatherton Towers	0·22
Sunnyside	0·95
Vischgat...	
Fort Beaufort	0·46
Katberg	2·60
Balfour	
Seymour...	0·43
Glencairn	2·20
Alice	
Lovedale...	0·81
Port Alfred	1·40
Hogsback ...	2·87
Peddie	0·17
Exwell Park . .	
Keiskamma Hoek . .	1·16
Cathcart, Gaol	0·69
Cathcart, Forest	0·53
Cathcart...	
Thaba N'doda	1·19
Evelyn Valley . ..	4·31
Crawley	0·00
Thomas River	0·86
Perie Forest ...	1·23
Forestbourne .. .	2·27
Isidenge	1·77
Kologha	2·10
King William's Town, Gaol ...	0·61
Do. Do., Dr. Egan	0·87
Stutterheim, Wylde... ...	
Do., Bestó	1·56
Fort Cunynghame	1·13
Dohne	
Kubusie	0·71
Quacu	1·14
Blaney	0·25
Kei Road	0·96
Berlin	
Bolo	0·20
Fort Jackson	1·20
Prospect Farm, Komgha .	0·60
Komgha Gaol	0·43
Chiselhurst	

X. SOUTH-EAST (*continued*):

	Ins.
East London West	0·48
East London East	...
Cata	2·88
Wolf Ridge	3·19
Dontsah	1·55
Mount Coke	0·90
Blackwoods	0·99
Albert Vale, near Bedford	0·43
Huxley Farm, Stutterheim	0·70

XI. NORTH-EAST:

	Ins.
Venterstad	0·92
Mooifontein	0·60
Burnley, Cyphergat	...
Burghersdorp, Gaol	0·82
Ellesmere	0·65
Molteno	0·96
Lyndene	0·74
Cyphergat	0·84
Thibet Park	0·45
Sterkstroom Station	0·41
Do. Gaol	0·79
Rocklands	...
Aliwal North Gaol	0·68
Do. Brown	...
Do. Dist. Engineer	1·09
Buffelsfontein	0·54
Hex's Plantation	...
Poplar Grove	...
Carnarvon Farm	0·22
Halseton	0·30
Jamestown	1·08
Whittlesea	0·62
Queenstown Gaol	0·34
Do. Beswick	.
Rietfontein, Aliwal North	1·37
Middlecourt	...
Dordrecht	0·55
Tylden	0·42
Nooitgedacht	..
Herschel	1·55
Lady Grey	1·51
Lauriston	...
Lady Frere	0·43
Contest, near Bolotwa	0·53
Sterkspruit	2·18
Doornkop	...
Avoca, Barkly East	...
Keilands	0·33
Palmietfontein	...
Barkly East	1·38
Blikana	1·54
Glenlyon	...
Rhodes	...
Gateshead	...
Cliftonvale	...
Albert Junction	0·99
Queenstown, District Engineer's Office	...
Hughenden	0·53
Glenwallace	0·43
Indwe, District Engineer's Office	0·66
Bensonvale Inst., Herschel	...
Cathcart, Queenstown	0·78
Royal, Div. Albert	...
Dordrecht, D.E.'s Office	0·33
Stormberg Junction	0·83
Broughton, Molteno	1·24

XII. KAFFRARIA:

	Ins.
Ida, Xalanga	0·71
Slaate, Xalanga	0·97
Cofimvaba	0·90
Tsomo	0·51
N'qamakwe	0·45
Main	0·59
Engcobo	1·00
Butterworth	0·65
Woodcliff	2·48
Kentani	1·52
Maclear	1·21
Idutywa	0·25
Bazeya	3·58
Willowvale	1·52
Mount Fletcher	1·13
Somerville, Tsolo	0·55
Elliotdale	0·69
M'quanduli	...
Matatiele	...
Umtata	0·89
Cwebe	...
Tabankulu	2·16
Mount Ayliff	2·49
Kokstad	1·11
Do., The Willows	1·43
Seteba	2·20
Flagstaff	2·37
Insikeni	2·92
Port St. John's	4·12
Kilrush, Sneezewood	...
Umzimkulu	1·41
Mandileni	...
Wanstead	...
Cedarville	...
Maclear Station	1·13
Elliot Station	0·52
Tent Kop, Elands Height	2·40
Umzimkulu, Strachan	1·92

XIII. BASUTOLAND:

	Ins.
Mafeteng	1·39
Mohalies Hoek	...
Maseru	1·95
Teyateyaneng, Berea	2·56
Moyeni Quthing	3·06
Qacha's Nek	4·73
Leribe	...
Butha Buthe	...

XIV. ORANGE RIVER COLONY:

	Ins.
Bloemfontein	...
Kroonstad	2·81

XV. NATAL:

	Ins.
Durban, Observatory	4·56

XVI. TRANSVAAL:

	Ins.
Johannesburg	...

XVII. BECHUANALAND:

	Ins.
Taungs	0·88
Vryburg	1·25
Mafeking	0·51
Setlagoli	0·84
Kuruman	0·90
Zwartlaagte	...
Dry Harts, Vryburg	1·12

XVIII. RHODESIA:

	Ins.
Hopefountain	2·01
Rhodes Matoppo Park	1·57

XIX. DAMARALAND:

	Ins.
Walfish Bay	...

DEPARTMENTAL NOTICES.

Sale of Fruit in South African Markets.

The following Notice affecting the sale of Cape Fruit in S.A. Markets is published for general information :—

The Government having given careful consideration to the growing importance of the outlet for Cape fruit, more especially grapes in the large centres of distribution in South Africa earnestly urges that the prevailing system of packing in what is commonly called the bushel-basket, should be superseded by the use of boxes and woodwool.

It is generally admitted in Johannesburg and Kimberley that grapes neatly packed in boxes fetch higher prices than those which are indiscriminately heaped upon the market in rough and frequently unattractive baskets, and the condition of this trade is rendered distinctly unfavourable to producers from the fact that the sale of grapes and other fruit in baskets is almost wholly identified with the Greek and Coolie hawkers.

Owing to the enormous waste of space in trucks in which fruit packed in baskets has heretofore been conveyed the Railway Department has been obliged to differentiate the rates for fruit as follows :—

(*a*) Fruit packed in boxes or in baskets provided with cross-sticks, ½d. per ton per mile plus 1 8 per ton terminals, except for distances under 30 miles, in which case rates shall be somewhat higher

(*b*) Fruit packed in baskets without cross-sticks, ¾d. per ton per mile, except for distances under 100 miles when rates shall be somewhat higher.

It must be further understood that the conveyance of fruit in baskets with or without cross sticks will not be continued after the season 1907-8.

Special arrangements have been made by the Government for the supply of boxes to fruit farmers, and farmers may order their requirements through the nearest Stationmaster to whom they will be supplied on the C.O.D system.

It may be added that agents approved of by the Government and who have deposited security with the Treasurer of the Colony to indemnify consignors of produce against bad debts have been appointed and are prepared to give special attention to the handling of fruit at Johannesburg.

The Government having invited Tenders for supplies of fruit boxes, for farmers during the forthcoming fruit season has accepted that of Messrs. Purcell, Yallop & Everett, of Cape Town, particulars of the sizes and prices of which have been published in *Government Gazette* Notice No 1220 of the 12th November, 1907.

P. J. HANNON,
Superintendent of Agricultural Co-operation.

Exportation of Cape Fruit.

It is hereby notified for general information that, in view of the success which has attended the efforts of the Government to build up an export trade in Colonial fruits with England and the Continent, it has been decided that the Government Fruit Export Scheme shall be continued during the forthcoming fruit season.

Consignments of fruit for shipment under this Scheme will therefore be received from farmers and others by the Station Masters or Foremen-in-Charge at all stations

and sidings (where there is an official on duty) on the Western and Midland Systems and also on the Port Elizabeth-Avontuur Branch to be forwarded to Cape Town Docks and Algoa Bay respectively, subject to the conditions hereinafter set forth.

1. All fruit received from senders and forwarded by the Railway Department under this scheme is taken in charge by the Government on the distinct understanding that payment therefor will only be made to the consignor after the returns of the prices obtained have been received, *i.e.*, subsequent to the sale of the fruit in Great Britain.
2. The railway carriage of such fruit may be charged forward, and it will be debited to a special account in the Treasury Department.
3. All such fruit must be selected, graded and packed by senders in accordance with the instructions issued by the Superintendent of Agricultural Co-Operation.
4. Boxes for the conveyance of this fruit must be of the standard sizes, and made in accordance with the specification prescribed by Government, otherwise the Station Master will refuse to accept them.
5. Tenders have been accepted from Messrs. Purcell, Yallop & Everett, Cape Town, to supply bundles of wood for the construction of fruit packages (not less than 20) and the wood wool requisite for packing purposes. Such materials may be ordered direct from the manufacturer or through the local Station Master, who will forward the order immediately to the Superintendent of Agricultural Co-operation, Cape Town, when it will be executed and the goods despatched and delivered on the "Collect on Delivery" System. The prices of the boxes and wood wool are as follows:

Class of Box	Size	Price per Box.
Large Grape... ..	24 × 18 × 6	7½d
	24 × 18 × 6¼	7¾d.
Small Grape . .	18 × 12 × 6	4d.
	18 × 12 × 5½	3⅞d.
Peach	18 × 12 × 4	3¼d.
	18 × 12 × 3½	3⅛d.
Plum .	18 × 12 × 3	2¾d.
	18 × 12 × 2½	2⅝d.
Pear	18 × 12 × 6	4d
	18 × 12 × 5	3⅝d.
Apricot	18 × 12 × 2½	2½d.
	18 × 12 × 2	2⅜d.
Orange . ..	27 × 12 × 12	10d.
Half Orange .. .	13½ × 12 × 12	6½d.

Wood wool at the rate of 8s 6d. per 100 lbs. in bales of 25 lbs., 50 lbs., 56 lbs., and 112 lbs. each.

6. Each package of fruit must have impressed upon it a distinctive device, name or letter (to be selected by the Consignor), which mark must be registered by the Station Master at the forwarding station in a book kept specially for the purpose. No two exporters are allowed to use similar marks for their packages.

   Stencils for branding the packages may be ordered direct from Messrs. W. H. Armstrong & Company, Cape Town, or in the same manner as wood and wood wool, *i.e.*, from the Superintendent of Agricultural Co-operation through the local Station Master at 2½d. per letter.
7. Special address cards which must always be used—will be provided free by the Railway Department, and they should be carefully filled in and securely tacked on to the boxes; these cards bear the words "Cape fruit for export; highly perishable." and have spaces for the sender's name and that of the forwarding station.
8. All fruit consigned in accordance with the terms of this Scheme will be examined by the Government Fruit Inspector before being forwarded to England, and the Inspector may, in the exercise of his discretion, wholly reject packages or consignments, the character of which might be regarded as detrimental to the standing of Cape fruit in British or Continental markets.
9. A special consignment note for fruit despatched in connection with this Scheme will be issued to the principal fruit forwarding stations and sidings. On the back of this note space is provided for the consignor to declare whether, in the event of his fruit being ineligible to receive the Government Brand, it

may still be forwarded to England for sale unbranded, or disposed of locally; it must be understood, however, that this in no way interferes with the powers invested in the Inspector to reject unsuitable fruit.

Four copies of each consignment note must be made out and signed by the consignor, the copies being dealt with as follows:— One to be handed to consignor as a receipt for the fruit; one to be retained by the sending station; one to be posted immediately to the Superintendent of Agricultural Co-operation, Parliament Street, Cape Town; and one to be sent to the Government Fruit Inspector at the shipping port, accompanying the invoice

10. The fruit must be addressed and invoiced to the Tardes Commissioner, 98, Victoria Street, Westminster, London, S.W., particulars of the quantities forwarded being wired by the Station Master to the Goods Superintendent at the shipping port at time of despatch. In the case of Western Province fruit, Station Masters must not accept consignments of fruit for the Union-Castle Mail steamers unless the traffic can reach Cape Town not later than the Sunday morning prior to the sailing of such steamers. Consignors must be careful to obtain from the Station Masters reliable information regarding the train arrangements, in order that they may be in a position to comply with the Table Bay Harbour Board requirements, which stipulate that all fruit for shipment must be placed in the Harbour Board Cold Chambers and kept there at least 48 hours before being shipped.

Fruit from Main Line Stations south of Touws River for shipment by the weekly mail steamer must be forwarded on the Saturday by the 66 Up goods train ex Touws River and fruit from Stations on the Stellenbosch Branch must likewise be sent by the 56 Up goods train on Saturdays.

Particulars of the train service for fruit from other stations on the Western System should be obtained from the Traffic Manager at Cape Town, and similar information for Midland Stations should be got from the Traffic Manager at Port Elizabeth, while particulars regarding train service, etc., on the Port Elizabeth-Avontuur Line can be had from the Railway Superintendent at Port Elizabeth

Fruit for shipment should be sent by Goods Train to avoid the road transit between passenger stations and Docks

11 The Superintendent of Agricultural Co operation will obtain summaries of all fruit shipped, and a cable message will be despatched to the Agent General in London advising, in accordance with a pre arranged code, the quantities and general descriptions of the fruit thus being forwarded

12. Special arrangements have been made between the Government and the Union Castle Steamship Company to enable the fruit, immediately on arrival at Southampton, to be taken in charge by the Trades Commissioner of the Cape Government in London

13. The Superintendent of Agricultural Co operation will forward by each mail steamer invoices in duplicate giving full details of each consignment of fruit, and such invoices will be made the basis of distribution and collection of sale prices in England

14 The Trades Commissioner in London will receive all fruit consigned under this scheme and distribute it to the trade with whom he will be in communication during the period intervening between the receipt of the advisory cable and the fruit itself.

15 The Trades Commissioner in London will charge freight and cost of distribution against each bulk consignment, and the balance will be remitted through the Agent General to the credit of the Treasury Account opened for this purpose, and the Superintendent of Agricultural Co-operation will forward through the Post Office to all consignors the respective amounts payable to them for their fruit As far as possible a report on the character of each consignment will be sent with the remittance

Last season the export trade in fruit was confined to the Western Province (shipped at Cape Town) and Stations on the Midland System and Port Elizabeth-Avontuur Line (shipped at Port Elizabeth), but if circumstances this season warrant it, arrangements can be made for the shipment of fruit at East London and Mossel Bay.

It should be understood that this scheme is being continued by the Government in order to further encourage fruit culture and more up-to-date methods in packing and transit; and in every district where any considerable quantity is grown it may again be urged that Co-operative Associations should be established, through the medium of which considerably greater efficiency and economy could be maintained

P. J. HANNON,
Superintendent.

Cape Town, 8th November, 1907

DEPARTMENTAL PUBLICATIONS.

The following pamphlets, reprints, etc., are obtainable on application to the Editor of the *Agricultural Journal*, Department of Agriculture, Cape Town. Members of Farmers' and Fruit Growers' Associations applying for same through the Secretaries of these Associations are supplied free of charge.

Agricultural Miscellanea, price 6d. each. Extracts from Vol. I. to V. of *Agricultural Journal.*

Artificial Grasses and Fodder for Stock; Ensilage; Treatment of Cereal and other Crops; Viticulture and Wine Making; Forestry; Locusts and their Destruction; Possible New Industries for Cape Farmers: Dairying; Fruit Culture (6d.).

Agriculture.

Wheat Production in Australia (1s. 6d.) by A. C. Macdonald; *Wheat Production in Australia (1s. 6d.) by W. Halse and J. D. J. Visser ; Hop Cultivation (3d.) translated by A. W. Heywood; *Brak Land in Relation to Irrigation and Drainage (1d.); The Velvet Bean (1d.); Potato Disease (1d.); Scheme of Manurial Experiments (1d.); Leguminous Forage Crops for Trial in Cape Colony (1d.); Sundry Forage Crops for trial in Cape Colony (1d.); Poultry in South Africa: Rearing, Management and Improvement, with notes on Prevalent Diseases and Internal and External Parasites (3d.); The Salt Bushes (1d.); Tobacco Culture by P. Bornemisza (1d.); The Cultivation of Tobacco in the Colony by K. Schenck (3d.); Tobacco Wilt in Kat River Valley (1d.); *The Process and Appliances for the Flue Curing of Tobacco (3d.).

Dairying.

Dairy Breeds by A. C. Macdonald (9d.); *Dairy Industry in Great Britain by A. C. Macdonald (6d.); *Dairy Industry in Denmark (2d.); Ready Reckoner for Cream Testing (1s.); †Dairy and its Products by D. Hutcheon (2d.); *Cheddar Cheese Making (1d.).

Entomology.

The Bont Tick (1d.); Bean Bruchus (1d.); Cabbage Aphis (1d.); Codling Moth in Madeira Fruit (1d.); *Codling Moth (1d.); Fruit Fly (1d.); Fumigation Supplies (1d.); Insect Friends and Foes (1d.); Methods of Locust Destruction (1d.); *Peach Yellows (1d.); Pear Slug, Paris Green (1d.); Remedy for Mestwurmen (1d.); *Spray Calendar (1d.); *Spray Pump Notes (1d.); Scale Insects on Ornamental Trees and Plants (1d.); Two Pine Apple Pests (1d.); Tree Fumigation in California (1d.); Winter Spraying (1d.); Wattle Bag Worm (1d.); Bordeaux Mixture (1d.); Death Head Moth Superstition (1d.); Fumigation under Box Covers (1d.); The House Fly (1d.); New Oak Tree Pest (1d.); Nursery Inspection and Quarantine Bill (1d.); Potato Tuber Moth (1d.); The Codling Moth: Notes on its Life Cycle and Remedies (1d.); Gall Worms in the Roots of Plants (1d.); *The Fruit Fly (with coloured plates), (3d.); Another Introduced Scale Pest (1d.); Washes for Red Scale (1d.); Fruit Fly: Peach Fly Moth (1d.); Lime Salt Wash for Scale Insect (1d.); The Fruit Moth (1d.); Fusicladium of the Apple and Pear (1d.); Mealie Stalk Borer (3d.)—*coloured plate*; Cleaning up Nursery (1d.); Natural Enemies of the Fruit Fly: Report on Investigations in Brazil (1d.); Locust Birds and Locust Poison (1d.); The Brazil Fruit Fly Parasites (1d.); Cyanide Gas Remedy for Scale Insects (3d.); Arsenate of Lead (1d.); The Antestia Fruit Bug (1d.); Caterpillars Destroying Trees (1d.).

NOTE.—**All those marked with * are obtainable in Dutch and English.**
† Dutch only.

Forestry.

British National Forestry (1d.); Botanical Observations on Forests in Eastern Pondoland (1d.); †Elementary Principles of Sylviculture or Woodcraft (1d.); National Forests (1d.); Indigenous Timbers of the Cape (1d.); Misuse of Coal and the Uses of Forests (1d.); Tree Planting for Timber and Fuel (1d.); Tree Planting for Farmers (1d.).

Fisheries.

Trout and Carp Breeding and Stocking of Streams (1d.); *Methods of Preserving Fish by Smoking (1d.); Portable Floating Hatching Box for Trout Ova (1d.); The Protection of Trout (1d.); The Ocean and its Resources (1d.).

Horticulture.

Fruit Culture in the Gamtoos River Valley (1d.); *Marketing of Fruit (1d.); The Olive at the Cape (2d.); Tomatoes and Fruit for Export (1d.); Citrus Culture in Cape Colony: Report of the Citrus Commission (1d.); *Fruit from Orchard to Buyer (1d.); Netting for Fruit Trees (1d.); Fruit Culture in Argentina (1d.); Vegetables for Exhibition (1d.); Chrysanthemum Rust (1d.).

Veterinary and Animal Industry.

*Anthrax, Charbon, Mitzbrand or Miltziekte (1d.); *Heartwater (1d.); *Malarial Catarrhal Fever of Sheep (1d.); Rinderpest: Dr. Koch's Report (1d.); *Inoculation against Rinderpest (1d.); Dr. Kohlstock's Report on Inoculation for Rinderpest (1d.); *Redwater, Texas Fever or Tick Disease (1d.); *Redwater, Anthrax and Quarter Evil (1d.); *Sheep and Wool (1d.); The Eye and its Diseases (1d.); Husk, Hoose or Parasitic Disease of the Lungs of Cattle, Sheep and Pigs (1d.); Tick Heartwater Experiments (1d.); Indigestion and Diarrhœa in Calves (1d.); Persian Sheep and Heartwater (1d.); Poisoning of Stock (1d.); Retention of the Fœtal Membrane, or Afterbirth in Cows (1d.); Stijfziekte, Lamziekte or Osteo-Malacia and Paralysis (1d.); Tuberculosis and the Use of Tuberculin (1d.); African Coast Fever, with Description of Dipping Tank (3d.); *Rinderpest in South Africa (3d.) by D. Hutcheon; *Fluke or Slak in Liver of Sheep (3d.)—*coloured plate*; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte (1d.); Osteo Porosis (3d.)—*coloured plates*; *Glanders (3d.)—*coloured plate*; *Animal Castration (1d.); *Preventive Inoculation for Redwater (1d.); *Abortion in Cattle (1d.); Treatment for Worms in Domestic Animals (1d.); *Lungsickness of Cattle, Contagious Pleuro Pneumonia or Pleuro-Pneumonia-Bovum-Contagiosa (1d.); *Swine Fever, Hog Cholera or Pig Typhoid (3d.)—*coloured plates*; Castration of Females and Animals other than the Horse (1d.); Poisoning of Horses by *Ornithogalum Thyrsoides* or Chinkerinchee (*coloured plate*) (3d.); Horse Sickness by D. Hutcheon (2d.); Ticks and African Coast Fever (1d.); Cirrhosis of the Liver in Stock (1d.); Liver Disease among Calves (3d.); The Arsenite of Soda Dipping Mixture (1d.); *Lampas; Preventive Vaccination against Anthrax.

Viticulture.

†Reports on Viticulture (3d.); *Reconstitution of Phylloxerised Vineyards (1s.); Report on Failure of Hanepoot Grapes on American Vines (1d.); The Making of Wine and its By-Products (6d.); How to Treat Wine Casks (1d.); Failure of Vines (1d.); Manufacture of Dry Wines in Hot Countries (3d.); Anthracnose in Constantia (1d.).

Miscellaneous.

Game Seasons (3d.); Land Laws of Cape Colony (1d.); †Monsonia: the Cape Cure for Dysentery (1d.); *Rainfall in South Africa (1d.); Sand Dunes of Gascony (5d.); The Metric System (1d.); South African Stud Book Constitution, Rules, etc. (1d.); Bars in Ostrich Feathers (1d.); *Information regarding the Mining Laws (1s.); The Preservation of Game in Cape Colony.

Note.—All those marked with * are obtainable in Dutch and English.
† Dutch only.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 23rd November, 1907, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	s d	s d	£ s d	s d		
Aliwal North ..	0 14 0	1 0 0	0 16 0	0 6 0	0 7 6	0 4 0	0 12 0	0 6 6	0 1 0	6d.tot9d	7d. to 9d.	4d. to 6d	1/- to 1/4	0 1 0	£10 to £12	15/- to 17/6
Beaufort West ..	0 11 6	0 18 0	0 17 6	0 8 0	0 10 0	0 8 0	0 7 6	0 4 9	0 9 0	0 0 9	*4d.. to 6d.	*4d. to 5d	0 1 8	0 1 6	£15	19/-
Burgersdorp ..	0 14 0	0 19 6	0 16 6	0 7 0	0 8 0	0 6 6	0 7 0	10/- (bag)	0 3 0	9 to 1/-	0 0 9	0 0 5½	0 1 3	0 1 0	..	..
Cape Town ..	..	..	..	..	..	0 6 0	0 5 0	0 4 6	0 6 0	..	..	..	0 1 3	0 1 6	..	..
Clanwilliam ..	0 13 6	..	0 14 0	0 8 0	..	..	0 7 0	..	0 9 0	9d., 1/-	6d., 7d.	0 0 6	1/3 to 1/6	9d., 1/-	..	17/-
Colesberg	..	..	..	..	..	..	..	3/10(bag)	..	..	..	0 0 5	8d. to 11d.	9d. to 1/1	..	..
Cradock	0 15 3	..	0 14 3	0 6 3	0 9 0	0 6 0		0 6 0	0 18 0	0 0 9	0 0 6	0 0 6	0 2 6	0 1 5	£10	17/6
Dordrecht.. ..	0 10 6	0 19 6	0 13 6	0 4 6	0 7 6	0 4 0	0 5 0	0 3 6	0 3 0	0 1 0	0 0 6½	0 0 6½	0 1 6	0 1 0	£9	16/-
East London ..	0 7 0	0 11 0	0 9 0	0 5 3	0 8 0	0 5 3	0 5 3	0 5 0	0 6 6	0 1 6	*6d., †7d.	*6d., †7d.	0 2 0	0 1 6	£21	37/-
Graaff-Reinet ..	0 10 6	..	0 14 6	0 6 6	..	0 6 6	0 5 6	0 5 0	0 5 9	0 0 4	0 0 4	0 0 5	0 1 9	0 1 0	£12	16/-
Graham's Town ..	0 7 6	..	..	0 7 6	..	0 6 3	0 6 9	0 6 9	0 14 3	0 0 8¼	0 0 6½	0 0 7½	0 2 2½	0 1 3	..	..
Kimberley ..	0 12 0	0 18 6	0 15 6	0 5 0	0 6 6	0 7 6	0 7 0	0 6 0	3/9	0 0 7	0 0 10	0 0 8	..	0 1 4	£10 to £15	14/- to 17/-
King Wm.'s Town..	0 7 6	0 17 6	0 16 0	0 7 3	0 5 6	0 4 6	0 5 0	0 6 0	10/- new 4/6 old	0 0 6	0 0 6	0 0 6	0 1 9	0 1 0	£13 10s.	25/-
Malmesbury ..	0 12 0	0 16 6	0 13 0	0 7 6	..	0 6 0	0 5 0	0 3 0	14/- new 0 12 6	0 0 9	0 0 6	0 0 6	0 1 4	0 1 1	£10	21/-
Mossel Bay ..	0 13 6	0 17 0	0 14 0	..	..	..	..	0 5 6	0 10 0	..	..	0 0 8	..	0 0 8	..	..
Port Alfred ..	0 12 0	1 0 0	0 18 0	0 8 0	0 12 0	0 8 0	0 8 0	0 6 0	0 11 9	0 0 8	0 0 9	0 0 7	0 2 6	0 0 9	..	..
Port Elizabeth ..	0 9 0	..	..	0 7 6	..	0 5 6	0 7 0	0 5 0	0 13 6	..	0 0 7	0 0 7	0 1 9	0 1 3	..	..
Queen's Town ..	0 12 6	0 17 6	0 16 0	0 6 6	0 7 9	0 4 0	0 7 0	0 5 0	0 10 0	0 0 9	0 0 7	0 0 6	0 1 6	0 1 3	£12 to £14	18/- to 22/-
Tarkastad.. ..	0 13 6	0 15 6	0 12 6	0 7 6	0 10 0	0 7 0	0 10 0	0 5 9	0 6 0	0 0 7	*0 0 6	*0 0 6	0 1 8	0 1 0	£10	20/-
Vryburg	0 15 0	1 2 0	0 19 0	0 6 0	0 8 0	0 7 6	0 7 0	0 8 9	0 10 0	0 0 7½	0 0 6	0 0 6	0 1 6	0 0 9	£11 to £13	15/- to 17/6
Worcester.. ..	0 11 6	0 18 6	0 14 0	0 7 6	0 8 6	0 7 0	0 6 0	0 3 0	0 5 6	0 0 6	*6d., 9d. †5d., 9d.	*5d., 6d. †5d. to 6d.	0 1 4	0 0 10	£8 10s. to £12 10s.	21/6 to 23/6

NOTE.—A blank space denotes "no transactions." * Colonial. † Frozen.

THE PRODUCE MARKET.

CAPE TOWN.

Mr. R. Muller, of Strand Street, Cape Town, reports for the month ending November 30th :—

Ostrich Feathers.—The market is weak, with a lower tendency, especially for anything but the best quality. Buyers are waiting for the results of the London sales to show the position of the trade at Home. Superior plucking can be sold without difficulty it the limits are reasonable. The demand for common quality is restricted.

	£	s.	d.	£	s	d.
Super Primes	17	0	0	35	0	0
Firsts, ordinary to Super	11	0	0	14	0	0
Seconds	6	0	0	9	0	0
Thirds	5	10	0	6	10	0
Femina Super	12	0	0	16	0	0
Do., Seconds to Firsts	4	0	0	10	0	0
Byocks (fancy)	5	10	0	9	10	0
Long Blacks	3	10	0	7	0	0
Medium Blacks	2	15	0	3	10	0
Short to Medium	0	10	0	1	10	0

	£	s.	d.	£	s.	d.
Floss	0	5	0	1	15	0
Long Drabs . .	2	0	0	4	0	0
Medium Drabs	1	0	0	2	0	0
Short to Medium	0	15	0	1	0	0
Floss	0	5	0	1	15	0
White Tails	1	15	0	3	10	0
Coloured Tails	0	10	0	2	10	0
Chicks . .	0	1	0	0	2	0
Spadonas	2	10	0	4	10	0
Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—Since my last report, a considerable change has come over our market. The financial crisis in America has reacted on the industrial centres in Europe by causing a general weakening in wools of all grades The news from the London sales, which opened on the 26th, report that there was a large attendance of buyers, prices being irregular, and ruling from 5 to 10 per cent. lower for Snow Whites, and 10 per cent. lower for Grease Wools Stocks in Europe are, however, known to be scarce, and with a keen desire to buy, it is to be hoped that the market may steady itself again. In our local market prices are in sympathy lower. Export buyers are disinclined to operate freely until more definite news arrive.

	s.	d.	s	d.
Super long Grass Veld	0	8	0	10
Do. Karoo . .	0	6½	0	8½
Medium	0	4½	0	5½
Short and Inferior ..	0	3½	0	4
Wool for Washing . ..	0	5	0	6

	s.	d.	s.	d.
Snow-white Super to Extra	1	6	1	9½
Do. Ordinary	1	1	1	5
Fleece, Washed .	0	0	0	11

Mohair.—The Mohair Market is inactive. No transactions in Summer Hairs have taken place recently, which is causing stocks to accumulate. Some business has been done in Winter Hair, good average lots fetching up to 10d., while mixed parcels remain untouched. Good Winter Kids may be quoted from 12d. to 13d.

	s.	d.	s.	d.
Firsts Summer	1	1½	1	2½
Kids	1	3	1	6
Seconds	0	6½	0	10

	s.	d.	s.	d
Winter	0	9½	0	10
Do. Kids	1	0	1	1

Skins and Hides.—Reports from London show the Hide Market to be depressed, and prices have receded from ½d. to 1d. Goat Skins are also expected to recede in price.

	s.	d.	s.	d.		s.	d.	s.	d.
Long Woolled Skins	0	6¾	0	7¾	Goat, heavy to light	0	9½	0	10½
Short	0	6	0	7	Sundried	0	6¾	0	7
Shorn	0	5	0	5½	Angoras	0	6¾	0	7
Bastards	0	5	0	5½	Sundried Hides	0	6	0	9
Cape Skins, each	1	10	2	0	Salted	0	5	0	6½
Do. cut, each	0	0	1	0	Wet	0	3½	0	4

PORT ELIZABETH.

Messrs. John Daverin & Co. report under date November 29th:

Ostrich Feathers.—Our market was well supplied this week with a fair average assortment. Competition generally was rather better, especially for super qualities, which brought extreme prices. Ordinary, average, and common sorts ruled very irregular, and at times sold badly, but on the whole there was no quotable change in prices. There has been very little business done out of hand, buyer's ideas being quite ten per cent. below seller's limits. The next London Sales open on Monday, the 9th prox., when about £200,000 value will be offered. This quantity is less than was generally expected, but we understand that about £50,000 worth has been held over for the following sales in February, 1908. Notwithstanding this, it is expected that the sales will show a decline of about 10 per cent. The total quantity sold on our public market this week amounted to £10,091 19s. 4d. and weighed 4,579 lbs. 8¼ ozs. Stocks have increased somewhat, but new arrivals continue limited.

	£	s.	d.		£	s.	d.
Primes: Extra Super	Special Prices.						
Good to Super	15	0	0	to	20	0	0
Whites: Firsts	11	0	0	,,	14	0	0
Seconds	6	0	0	,,	10	0	0
Thirds	2	10	0	,,	5	0	0
Feminas: Super	11	0	0	,,	16	0	0
Firsts	7	10	0	,,	10	0	0
Seconds	4	10	0	,,	6	0	0
Thirds	2	0	0	,,	3	0	0
Greys	4	10	0	,,	8	10	0
Fancy	6	0	0	,,	10	0	0
Tails: White	1	10	0	,,	3	0	0
Light	1	5	0	,,	2	10	0
Coloured & Dark	0	5	0	,,	1	2	6

	£	s.	d.		£	s.	d.
Blacks: Long	3	0	0	to	6	0	0
Medium	1	5	0	,,	2	15	0
Short	0	7	6	,,	1	0	0
Wirey	0	1	0	,,	0	1	0
Floss	0	6	0	,,	1	7	6
Drabs: Long	1	10	0	,,	3	10	0
Medium	0	12	6	,,	1	0	0
Short	0	2	6	,,	0	6	0
Wirey	0	0	6	,,	0	1	0
Floss	0	6	0	,,	1	10	0
Spadonas: Light	1	0	0	,,	3	0	0
Dark	0	10	0	,,	2	0	0
Chicks	0	0	3	,,	0	2	6

The following may be quoted as the approximate current values of unsorted parcels per line:—

	Whites							Feminas.						
	£	s.	d.		£	s.	d.	£	s.	d.		£	s.	d.
Superior pluckings	9	10	0	to	11	0	0	6	15	0	to	8	10	0
Good Average lots	8	0	0	to	9	0	0	5	15	0	to	6	15	0
Poor Average lots	7	0	0	to	8	0	0	4	10	0	to	5	0	0
Common lots, stalky, narrow and discoloured	6	0	0	to	7	0	0	3	10	0	to	4	10	0

	Tails.					Blacks.					Drabs.					Spadonas.				
	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.
Good	25	0	to	30	0	25	0	to	35	0	15	0	to	20	0	30	0	to	40	0
Average	17	6	to	22	6	17	6	to	22	6	12	6	to	12	6	20	0	to	30	0
Poor	12	6	to	17	6	12	6	to	15	0	8	6	to	11	0	10	0	to	20	0

It will be understood that for special lots, these quotations may be exceeded.

Wool.—The London Sales opened on Tuesday last, and our cable reported that prices generally were a full penny per lb lower. Although it was generally anticipated that prices would decline, no one expected such a serious drop as this, consequently our market is in a very unsettled state, and at present it is very difficult to say how it will go, but the tendency is towards lower prices, especially for heavy and wasty wools. Super well-conditioned clips we do not think there is much danger in holding, but at the same time we see no prospect of getting anything like the top prices paid this season. This only goes to prove that those who are urging the farmers to ship their wools instead of taking the high prices that could have been obtained, and were obtained here, are no friends of the farmers. We think it would be well for farmers to remember what took place in 1899, when wools were sold at 11½d. here, and the same price refused for others; and these same wools were eventually sold on the basis of 5½d. The prices obtained here in the early part of this season were getting very close to the 1899 prices, and yet we found people recommending farmers to ship their clips. Comment on this, we think, is needless.

Snowwhite, Extra Superior ...	21d	to	22d
Do. Superior	19½d	„	20d
Do. Good to Superior ...	18½d	„	19d
Do. Inferior Faulty ...	17d	„	18d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	9½d	„	10d
Do. do. do. ...	8d	„	8½d
Do. do. Karoo grown (special clips)	7½d	„	8d
Do. do. do. ...	6¾d	„	7¼d
Do. do. Mixed Veldt...	7d	„	7½d
Do. Light, faultless, medium Grassveldt grown ...	6½d	„	7¼d
Do. do. Karoo grown	6¼d	„	6¾d
Do. do. short, dc	5¾d	„	6d
Grease, Coarse and Coloured ...	2½d	to	4d
Scoured do. do. ...	6½d	„	12d
Basuto Grease, short	6½d	„	6¾d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	7½d	„	8½d
Do. do. do. ...	6¾d	„	7¼d
Do. do. medium grown, light, with little fault	6¼d	„	6¾d
Do. do. short, faulty & wasty	5¼d	„	5¾d
Do. do. Karoo grown, long & well-conditioned ...	6½d	„	6¾d
Do. do. medium grown, light with little fault ...	5¼d	„	6d
Do. do. short, faulty and wasty...	4¾d	„	5d

Mohair.—The market remains very quiet, and the only sale of Firsts made during the week was a parcel of 73 bales of average quality, partly stained, at 1s. Several lots of Winter Hair were also sold at 10d.

Super Kids, nominal	17½d	to	18d
Ordinary Kids and Stained ...	16d	„	17d
Superior Firsts, special clips (nominal)	14d	„	14d
Ordinary Firsts...	13d	„	13½d
Short Firsts and Stained ...	12d	„	12d
Superfine Long Blue O.R.C. Hair	13d	„	13¾d
Mixed O.R.C. Hair (average)	11d	to	11½d
Do. very mixed ...	10d	„	10½d
Seconds and Grey	9d	„	10½d
Thirds	5½d	„	5¾d
Winter Kids, special clips ...	13½d	„	13½d
Do. good ordinary ...	12d	„	13d
Winter Hair	10d	„	10d
Basuto Hair	11d	„	11½d

Skins.—This market has become quite demoralised. At the Goatskin sale, held in London yesterday, only about a third of the offerings were sold, prices showing a drop of 1½d. to 2d. per lb. Sheepskins in bundles, 6d. per lb.; Pelts, 5d.; Capes, 1s. 8d. each; damaged, 6d. each; Goatskins, 7½d.; damaged, 5d. per lb.; Angoras, 6d.; Shorn, 5d.; damaged, 3d. per lb.; Springbok, 8d. each.

Hides.—Sundried, 6½d.; damaged, 5d. per lb.; Drysalted, 5½d.; damaged, 5d. per lb.

Horns.—Parcels all round sold at 3½d. each.